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Ontario Geological Survey
Open File Report 6152

Report of Activities, 2004 Resident Geologist Program

Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Ontario Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre

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Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Ontario Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre

by

P.J. Sangster, V.C. Papertzian, K.G. Steele, C.R. Lee, M. Barua, D.A. Laidlaw and T.R. Carter

2005

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ONTARIO GEOLOGICAL SURVEY

RESIDENT GEOLOGIST PROGRAM

REPORT OF ACTIVITIES—2004

SOUTHERN ONTARIO
REGIONAL RESIDENT GEOLOGIST REPORT

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Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Southern Ontario Regional Resident Geologist (Southeast Ontario District)–2004

by

P.J. Sangster, V.C. Papertzian and D.A. Laidlaw

2005

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Southern Ontario Regional Resident Geologist (Southeast Ontario District)–2004

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INTRODUCTION

In 2004, production from mines and quarries continued throughout the District within the Grenville Province and in the Paleozoic rocks to the south and east. In June 2004, Regis Resources Inc. started production of various fine grades of vermiculite from its deposit in Cavendish Township. Exploration for various non-metallic commodities including diamonds, dimension stone, vermiculite and wollastonite remained strong. Junior mining companies and prospectors showed continued interest in exploring for gold, copper-nickel and platinum group metals. Claim staking activity reflected a new interest in known occurrences of molybdenum and uranium.

MINING ACTIVITY

During 2004, there were 46 mineral extraction operations in southeastern Ontario, including: 6 industrial mineral operations; 2 trap rock producers; 3 cement producers' quarries; 1 brick producer's quarry; 3 gemstone and mineral specimen sites and 31 stone quarries. For a complete listing of mining activity and locations of operating mines and mills in southeastern Ontario, please refer to Table 1 and Figure 1, respectively.

In addition to the mining activity listed in Table 1 below, the Granimar Quarries Ltd. quarry located in Rear of Leeds and Lansdowne Township near Kingston was sold by auction in December 2003. The new owners have indicated their intention to resume production of Rideau Red granite dimension stone from the site in the near future.

Table 1. Mining activity in 2004 – Southern Ontario Regional Resident Geologist (Southeast District) (keyed to Figure 1).

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
1.	AECON (formerly Armbro Construction)	Marmora (Limestone)	Limestone is quarried from the former Marmoraton minesite for aggregate.
2.	Allan Franks Construction Ltd.	Madoc (Limestone)	Limestone has been quarried and crushed since 1991 for road aggregate.
3.	Amsen Quarries Ltd.	Harvey (Limestone)	Limestone landscaping stone products.
4.	Aqua Rose Quarries	Lyndoch (Gemstones, Mineral specimens)	Quarrying operations for rose quartz, beryl, feldspar, lyndochite, amazonite, cleavlandite, peristerite, columbite, fluorite and bertrandite. Two quarries are in operation: the Beryl Pit, which charges a fee for mineral collecting, and the Rose Quartz Quarry, which produces landscape stone.

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
5.	Arriscraft Corporation (Elgin Quarry)	Bastard (Sandstone)	Potsdam sandstone was quarried for the manufacture of reconstituted sandstone. Raw material was shipped to Cambridge for processing. In 1998, a new application was found with blocks being quarried and cut into tiles for lining acid tanks.
6.	Bancroft Chamber of Commerce (Bear Lake Diggings)	Monmouth (Mineral Specimens)	Fee for collecting site near Wilberforce. Field trips to this site organized by the Bancroft Chamber of Commerce attract on average 40 to 50 participants.
7.	Belmont Rose Granite Corp. (Belmont Rose Granite Quarry)	Belmont (Dimension Stone)	Granite is quarried for dimension stone, curbstone, landscaping stone, crushed decorative stone and exposed aggregate.
8.	Canada Brick (Russell Quarry)	Russell, Gloucester (Clay Products)	Clay bricks are produced from red shale. The quarry is located in Russell Township; the brick plant, in Gloucester Township.
9.	Canada Talc Division, Dynatec Mineral Products Division (Henderson Mine)	Huntingdon (Talc, Dolomite)	Dynatec acquired the industrial minerals division of Highwood Resources in 2002. Additional access to ore has been attained by the development of a new mining level (underground) at the Madoc Mine, which will allow for the planned increase in production to over 20 000 t per year. Similarly, the completed upgrading and expansion of processing lines at the Marmora processing plant has allowed for the increased volume of ground and micronized talc and dolomite products as well as the processing of other mineral filler products, principally barite. The facility now produces all of their high-end barite filler products for high-end industries located in the United States and South America.
10.	Central Ontario Natural Stone (Batty Quarry)	Laxton (Limestone)	Grey, buff and black limestone is produced as flagstone.
11.	Cornwall Gravel Company Ltd. (Cornwall Quarry)	Cornwall (Limestone)	Limestone for dimension stone is quarried on demand from the thick upper beds of this construction aggregate quarry. (Cornwall Black marble).
12.	Danford Construction (Springbrook Road Quarry)	Huntingdon (Limestone)	Limestone is quarried and crushed for road aggregate and specialty concrete (seasonal operation). Annually they produce 150 000 t of limestone and employ a staff of 24.
13.	Drain Construction	Dummer (Limestone)	Limestone for use as road aggregate.
14.	Drain Construction	Methuen (Granite)	Crushed stone for aggregate.
15.	Elite Blue Granite	Chandos (Marble)	Stone is split / guillotined for flagging and landscape stone.
16.	Essroc Canada Inc. (Picton Quarry)	Sophiasburg (Cement)	A cement plant and on-site limestone quarry with an annual production of slightly less than 1 000 000 tons. This is one of the largest cement plants in North America.
17.	Haliburton Stone Works	McClintock, Laxton (Granite and Limestone)	A variety of granite and limestone dimensional and landscape stone are produced from 2 quarries.
18.	I.K.O. Industries Ltd. (I.K.O. Quarry)	Madoc (Trap Rock)	Since 1991, I.K.O. Industries Ltd. has operated a traprock quarry east of Madoc on the south side of Hwy 7. The quarry is located within a ridge of grey to black, fine-grained, agglomeratic, metavolcanic rock. The rock is durable and exhibits no undesirable weathering effects. An on-site mill and colouring plant produce roofing granules, which are trucked to the company's asphalt shingle manufacturing plant in Brampton. In addition to roofing granules, stone from the quarry is crushed to produce HL-1 aggregate (asphalt road surfacing mix). The quarry is licensed under the Aggregate Resources Act to produce up to 1 Mt per year. A total of 70 people are currently employed at the quarry, mill and colouring plant.
19.	International Quartz Ltd.	McClintock (Quartz)	Crushed white quartz is produced on demand for local market.
20.	Jeff Parnell Contracting Limited	Galway (Limestone, Granite)	Natural and dimension cut armour stone, rockery stone, garden stone, natural surface steps and natural and dimensional flagstone. Burgundy-coloured granite from the site is being tested for decorative stone, landscaping and dimension stone applications.
21.	John Bacher Construction Limited	McClintock (Granite Gneiss)	Building stone, flagging stone, and landscaping stone.
22.	Karson Kartage & Konstruction Ltd. (Clarke Quarry)	Huntley (Limestone)	The quarry produces limestone for use as road aggregate.

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
23.	LaFarge Canada Inc. (Bath Quarry)	Ernestown (Cement)	A cement plant and on-site limestone quarry with a capacity to produce 1 Mt of cement. Silica used in the production of cement is extracted from the company's Potsdam sandstone quarry in Pittsburgh Township as well as from recycled foundry sands.
24.	Nelson Windover Quarries (Windover, Buckhorn Quarry)	Harvey (Limestone)	Grey limestone is quarried as a seasonal operation for the production of flagstone.
25.	North Hastings Aggregate Ltd.	Dungannon (Decorative Aggregate)	Multicoloured granite is extracted for use as decorative aggregate.
26.	OMYA (Canada) Inc. (Tatlock Quarry)	Darling (Calcite)	Calcitic marble is mined to produce high-purity, fine-grind calcite for fillers with terrazzo chips and landscaping stone as secondary products. Annual production is 250 000 tons and quarry reserves currently stand at over 5 000 000 tons. In 2000, a 5-year expansion program was completed at their quarry and plant located in Perth.
27.	Payne, E.W. (Payne Quarry)	Dummer (Limestone)	Flagstone is produced seasonally from this quarry.
28.	Preston, Larry	Galway (Granite)	Burgundy-coloured granite is quarried for use as crushed stone aggregate and decorative stone.
29.	Princess Sodalite Mine	Dungannon (Sodalite)	Decorative stone, landscaping stone, mineral specimens, including fee for collecting.
30.	Redstone Quarries	Galway, Harvey, Cavendish (Limestone, Sandstone)	Beige limestone and red sandstone are quarried for weathered landscaping stone and armour stone blocks.
31.	Regis Resources, Inc.	Cavendish (Vermiculite)	Regis Resources began producing vermiculite in June 2004. The mine produces fine, super fine, and micron grades of vermiculite, destined for markets in North America.
32.	Rideauview Contracts Ltd. (Ellisville Quarry)	Rear of Leeds and Lansdowne (Sandstone)	Sandstone produced for flagstone, granite blocks and masonry stone.
33.	Rideauview Contracts Ltd. (Pettworth and Renaud Quarries)	Camden (Limestone)	Limestone was quarried for building restoration work in Kingston.
34.	Rideauview Contracts Ltd. (Rideauview Quarry)	Storrington (Sandstone)	Red sandstone is produced for ashlar and flagstone.
35.	Rideauview Contracts Ltd. (Sloan Quarry, Battersea Quarry)	Storrington (Sandstone, Granite)	Cream and red sandstone are quarried for the production of ashlar, flagstone and landscaping stone at the Sloan Quarry. Red granite is quarried at the Battersea Quarry.
36.	Royel Paving	Galway (Granite)	Granite is quarried and crushed on-site for road aggregate.
37.	Senator Stone	Elzevir (Marble)	The quarry began production in 2001. White calcitic marble is quarried seasonally and crushed on-site.
38.	Senator Stone	Faraday (Marble)	The quarry site was brought to mining lease in 2002. ('Temagami Pink' marble breccia.)
39.	St. Lawrence Cement Inc. (Ogden Point Quarry)	Cramahe (Limestone, Cement)	The quarry has been in production since 1959. It produces between 1.9 to 2.1 Mt of limestone per year. Crushed stone from the quarry is shipped by lake to the company's cement plant in Mississauga. The quarry employs 20 people.
40.	Stone Cottage Inn Ltd. (Attia Quarries)	Harvey (Limestone)	Grey limestone is quarried for dimension stone.
41.	Timminco Ltd. (Timminco Metals Quarry)	Ross (Magnesium, Strontium and Calcium metal)	Magnesium is produced from high-purity dolomite mined at this location. Calcium and strontium are produced from purchased limestone. Production rate is 1000 tons of dolomite weekly. The annual production is 6000 tons of magnesium metal and alloys; 400 tons of calcium metal and alloys; and 135 tons of strontium metal. The operation employs 240 people and there are reserves for 50 years at the current rates of production.
42.	Trigan Resources Inc.	Methuen (Aggregate)	Metagabbro is quarried and crushed on-site for use as premium aggregate for HL1 purposes. Portable crusher is moved on-site as required. Production began in December 2002. In 2003 production totaled 100 000 t. Product is used by Miller Paving and also sold outside the company.

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
43.	TRT Aggregates Ltd.	Ameliasburgh, Hilliard, Tyendinaga, Thurlow and Richmond (Limestone)	Rough dimension stone blocks, armour stone, flagstone and crushed limestone are produced. Most of the quarries are operated on an as-needed basis.
44.	Unimin Canada Ltd. (Blue Mountain Quarry)	Methuen (Nepheline Syenite)	Nepheline syenite is mined from a quarry and processed in 2 mills. Magnetite is produced as a by-product. Production rate is 2500 tons per day. The mine has operated since 1955 and employs 152 people.
45.	Upper Canada Stone Co. Ltd. (Mephisto Lake Quarry)	Cashel (Calcitic Marble)	White marble is quarried and sold as crushed marble, landscaping stone, decorative stone and in pre-cast architectural concrete and panels.
46.	Upper Canada Stone Co. Ltd., Upper Canada Minerals Inc	Madoc and Huntingdon (Marble)	Red, pink, white, green, buff, black, blue, chocolate, light buff and light green marble varieties are mined from 8 quarries in the Madoc area. Marble chips (terrazzo), exposed aggregate and landscape stone are produced at the mill. In 2001, Upper Canada Stone acquired operations of Specialty Aggregate - Madoc plant and quarries.
47.	Upper Canada Stone Co. Ltd., Upper Canada Minerals Inc	Rear of Leeds and Lansdowne (Granite)	Red granite is quarried for armour stone, landscaping, architectural and structural stone from both quarries. (Kingston Red Granite Co. Ltd. (Seeley's Bay Quarry #1 and Seeley's Bay Quarry #2)).

Magnesium

Since 1942, magnesium metal has been produced from a deposit of high purity dolomitic marble in Ross Township near Haley, approximately 100 km west of Ottawa.

Timminco Limited currently owns and operates the silicothermic reduction facility at Haley. The plant is a fully integrated magnesium facility, incorporating a dolomitic limestone deposit and facilities for calcination, feed preparation, reduction, refining, and casting of ingots and billets. Secondary processing facilities include an extrusion and anode fabrication and assembly plant, magnesium billet and slab processing facilities and an array of specialized equipment to produce specialty magnesium metal and alloys to specific shapes and sizes. The facility also produces MAG-CAL, one of Timminco's principal specialty products.

Timminco also operates a modern ISO-certified metal reduction and casting plant in Westmeath, Ontario, located approximately 50 km west of the Haley facility. Westmeath produces many of Timminco's proprietary specialty products such as strontium-aluminum alloys, CAL-ALTM, calcium metal and particulated calcium and aluminum granules.

As the recognized leader in the production of the highest purity magnesium metal and related specialty alloys, Timminco has secured a dominant position worldwide in several key markets where purity is critical.

In July 1998, Timminco approximately doubled its sales revenues through the acquisition of a magnesium extrusion and fabrication facility in Aurora, Colorado. The acquisition provided modern, well-maintained equipment that is complementary to the company's extrusion plant in Haley.

In September 2004, the company announced the acquisition of Becancour Silicon Inc., a Quebec-based company that produces high-quality chemical- and electronics-grade silicon metal and specialty ferrosilicon. The acquisition supports Timminco's strategy to create a larger, more diversified manufacturing company selling a broader range of specialty and light metals (Timminco Limited, press release, September 2004).

Timminco's combined Ontario operations currently employ 240 people.

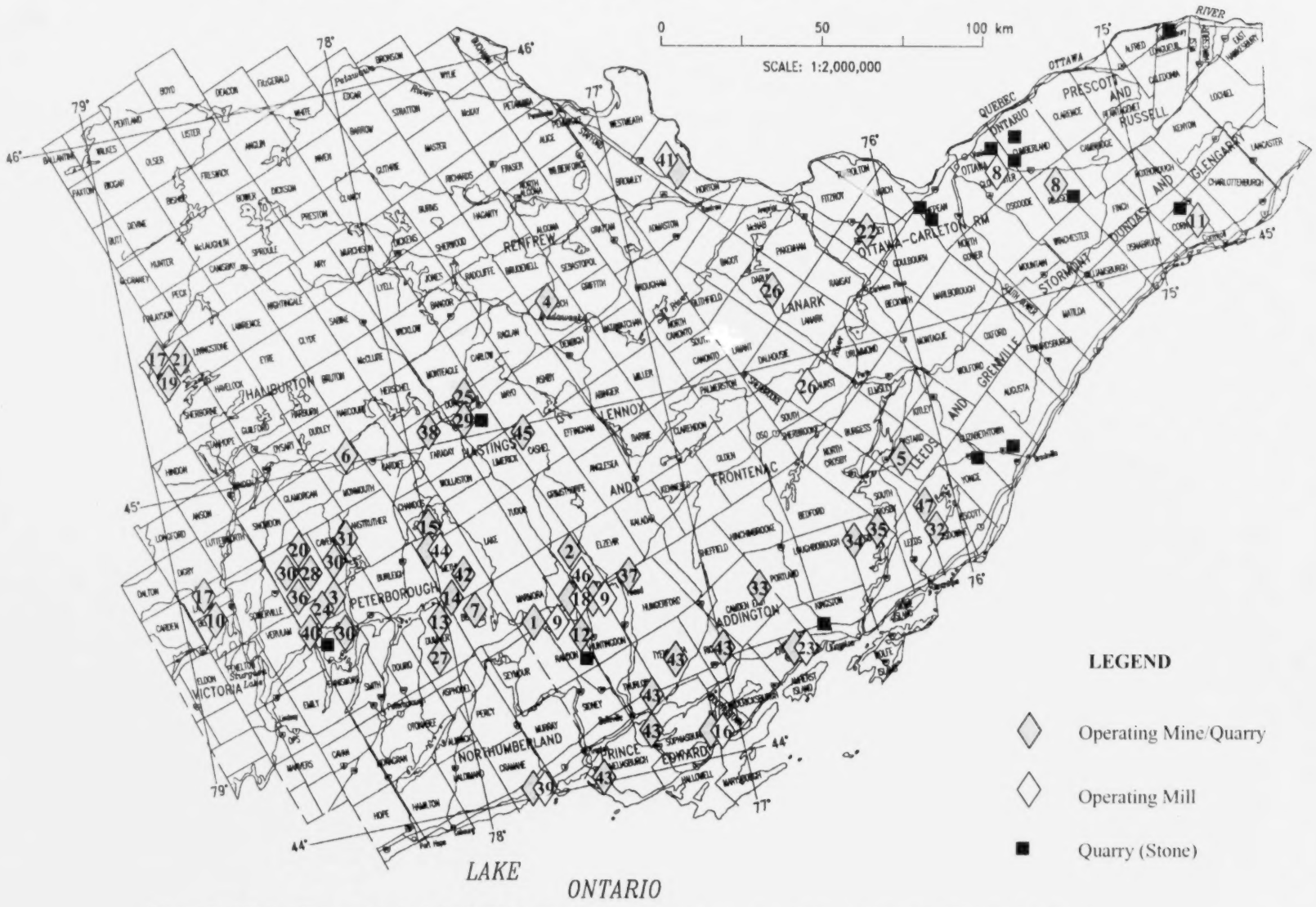


Figure 1: Mining/Quarrying Activity in 2004 - Southeast District, Southern Ontario Regional Resident Geologist

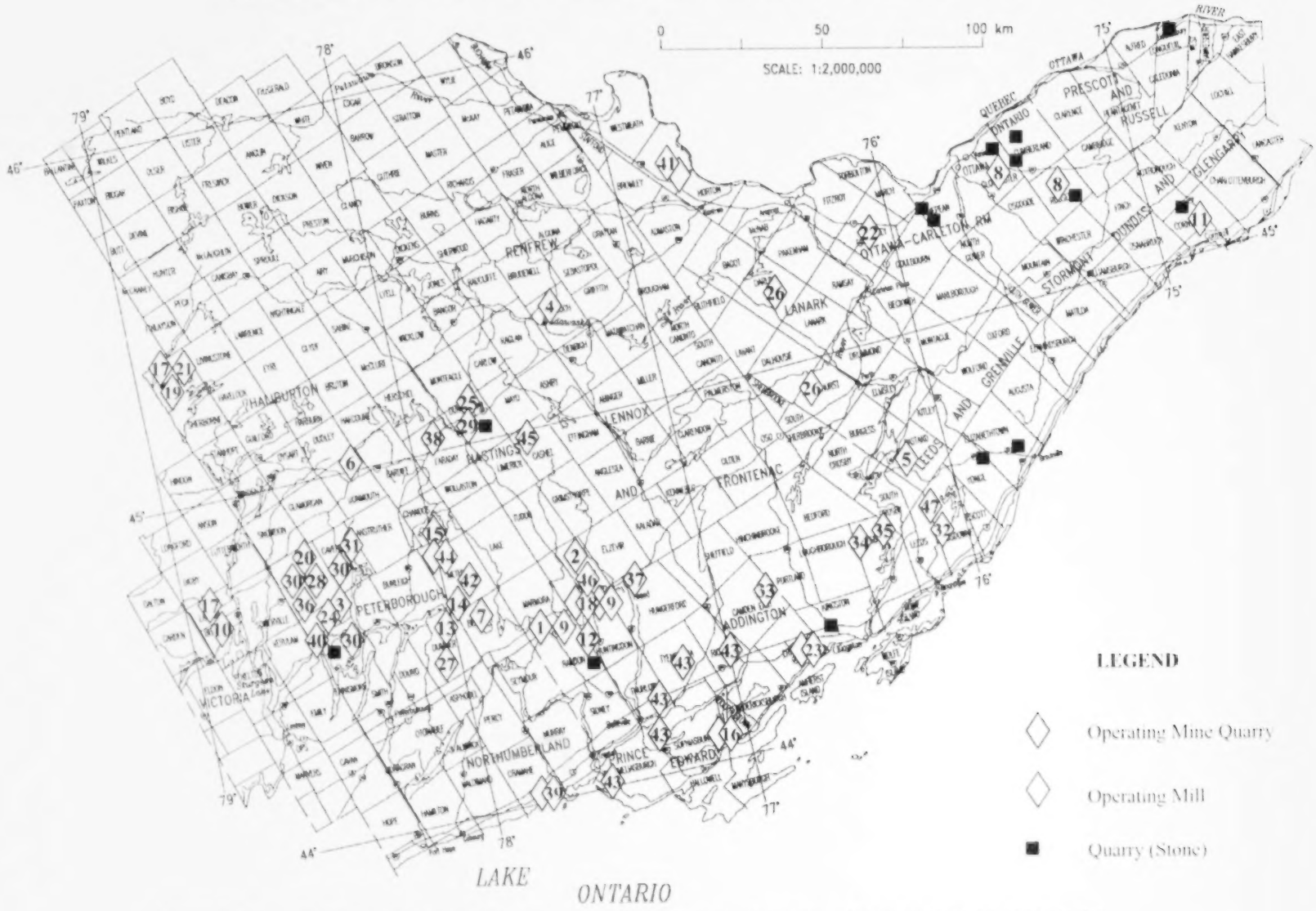


Figure 1: Mining/Quarrying Activity in 2004 - Southeast District, Southern Ontario Regional Resident Geologist

ADVANCED EXPLORATION AND DEVELOPMENT

Canadian Wollastonite – St. Lawrence Deposit

In 2004, Canadian Wollastonite completed a bulk sample testing program and process design study on the St. Lawrence wollastonite deposit in Pittsburgh and Leeds and Lansdowne townships.

A new beneficiation process developed jointly by SGS Lakefield Research and Canadian Wollastonite was implemented and successfully tested. A grinding configuration using a specific grinding medium and screening method was developed, which resulted in a product with a high aspect ratio at a relatively coarse grind.

A simple flotation technique was developed using a line of collectors to effectively remove various impurities from the wollastonite ore. Collectors are used to remove silica and feldspar, as well as diopside. Varying the level of the diopside collector can control both grade and recovery of the wollastonite ore. Results have indicated that a high-grade wollastonite concentrate will be produced from this newly developed process.

Canadian Wollastonite is presently completing pre-production engineering and development work, and plant construction is projected to begin by the fourth quarter of 2005. Once production commences, an initial estimated rate of extraction will be 5000 to 10 000 tonnes per year, eventually growing to 20 000 tonnes per year. Actual quarrying will take up to a couple of weeks per year during the summer months, while beneficiation and milling will be an 8 to 9 month per year operation (B. Vasily, Canadian Wollastonite, personal communication, 2004; Canadian Wollastonite website, 2005).

The following description of the deposit has been supplied by Canadian Wollastonite:

> The Saint Lawrence Wollastonite deposit occurs within a horseshoe shaped band of quartzite open to the east. The deposit is composed of calc-silicate and silicate skarn layers interbanded and strongly folded within the enveloping quartzite. The southern boundary of the skarn is in thermal metamorphic contact with a gabbroic intrusive which has a syenitic and late pyroxenite phase. The entire package has undergone granulite facies metamorphism. Wollastonite skarn formation is limited to the inner portion of a southwest plunging fold, which closes to the west. The Wollastonite skarn zones present within this inner fold cover an area of 275 acres, of which 120 are included in the St. Lawrence deposit property. Wollastonite skarn (ca. 9.6 Mt) with an average wollastonite content of 41.3% is observed in bands averaging 12 meters folded repeatedly throughout the property. The average mineral content consistently associated with the wollastonite is: diopside/hedenbergite 40%, feldspar (predominantly albite with relatively minor microcline) 10%, quartz 5%, calcite trace <2%, sulfides (pyrrhotite and pyrite) <1% and garnet, graphite, phlogopite trace <1%. The wollastonite skarn typically grades into a calc-silicate skarn with a wollastonite content of >20% and <35% wollastonite. The decrease in wollastonite is generally accounted for by an increase in feldspar content.

Lavant Muscovite Prospect – Gleeson Rampton Explorations

In 2004, Gleeson Rampton Explorations completed beneficiation studies of mini-bulk samples taken from surface outcrops. Beneficiation testing by SGS Lakefield indicated that following flotation and magnetic separation of core sample yielded a 96% pure muscovite product with a 76% overall recovery. SGS concluded that the muscovite ore has good potential for making a saleable product.

Previous work on the property identified high-grade, flake-muscovite-bearing schist ranging in thickness from 2 to 10 m over a continuous strike length of 1200 m. The total strike length of the prospective zone is over 4000 m. Field and petrographic estimates of the high-grade material range from 30 to 50% muscovite. Crushing and processing of small samples has indicated that the muscovite is relatively coarse, crushes and delaminates easily, is not particularly brittle, has a good aspect ratio and will produce a good concentrate of clean, clear mica. The prospect is currently available for option (V. Rampton, personal communication, January 2005).

EXPLORATION ACTIVITY

In addition to the property descriptions below, a summary of claim staking and exploration activity carried out in the Southeast Ontario District in 2004 is presented in Tables 2 and 4, and Figures 2 and 3. Assessment files received in the Southeast Ontario District office in 2004 are listed in Table 3.

Gold

R. DILLMAN AND J. CHARD

Prospectors R. Dillman and J. Chard continued exploration of known zones of gold mineralization and discovered new showings in 2004 on their properties in Grimsthorpe and Tudor townships. Work included geological mapping, prospecting, surface sampling and channel sampling in existing trenches. During the past year, additional claims were staked in Grimsthorpe Township (assessment files, Tweed Resident Geologist Program office (RGPO); R. Dillman, personal communication, 2005). The claims encompass 3 historic past-producing gold deposits and a section of the Moira River Fault.

C.J. LAIDLAW AND T.J. BEESLEY

Prospectors C.J. Laidlaw and T.J. Beesley acquired the site of the past-producing Craig Mine in Tudor Township by staking in early June 2004. From 1905-06 the mine produced 248 ounces gold from 1850 tons milled at a recovered grade of 0.13 ounces per ton gold. The gold mineralization occurred in quartz veins and stringers that cut mafic volcanic rocks. There are 2 shafts and limited underground development on the deposit. Exploration of the property during the 2004 field season included sampling and assaying of surface materials. Additional exploration and evaluation of the property is planned for 2005 (C. J. Laidlaw, personal communication, 2004; Gordon et al. 1979).

E. NECZKAR AND D. BAIRD

In November 2004, prospectors E. Neczkar and D. Baird acquired 6 claims through staking in Madoc and Marmora townships. The claims comprise a portion of the Dingman gold deposit originally explored by Noranda Exploration Co. Ltd. in 1986. Noranda completed diamond drilling totaling 21 326 feet and metallurgical testing.

In 1997, the property was purchased by Rajong Resources, which later became Deloro Minerals Ltd. In 1997, Deloro Minerals drilled an additional 14 holes totaling 2053 m to further evaluate the deposit. In 1998, a Deloro Minerals press release stated that the previous owner had "defined a geological resource of 4 000 000 tons grading 0.048 ounces per ton gold, or just under 200 000 contained ounces."

The gold mineralization principally occurs within an 800 m by 150 m strongly sheared and altered granitic intrusive rock peripheral to the Deloro Pluton. Since acquiring the claims, Mssrs. Neczkar and Baird have completed office research and examination of drill core on file with the Tweed Resident Geologist Program office (RGPO). Additional work is planned for 2005 (Tweed RGPO MDI files; E. Neczkar and D. Baird, personal communication, 2004).

Copper

PELANGIO MINES INC.

In January 2005, Pelangio Mines Inc. announced the results of the 2004 diamond drill program completed on the Simon Copper prospect. The program was designed to evaluate 2 new anomalies near the known Simon Copper South Zone and to further evaluate the SCSZ. Five holes totaling 1008 m were completed. Drilling was successful in extending the zone at depth and along strike. Hole SC6 confirmed a broad mineralized zone of copper sulphides at a depth of 200 m below the surface expression of the zone. The company reports values of 0.4% copper over 9.9 m for the lower SCSZ. Portions of the zone also contain significant zinc mineralization as well as copper values.

The best intersection was 1.11% copper and 2.83% zinc over 3.23 m in Hole SC6. Minor precious metals are associated with richer base metal sections. Preliminary information indicates the possibility of more than one base metal zone on the property. The company has announced plans to spend an additional $300 000 in exploration of the property in 2005 (Pelangio Mines Inc., press release, January, 2005).

Nickel - Copper

LIMERICK MINES LIMITED

Limerick Mines Limited continued exploration on its nickel-copper prospect in Limerick Township. The Bicroft Division of Macassa Mines discovered the prospect in 1961 while investigating magnetic anomalies identified on government airborne magnetic maps. A description of previous work on the property and geology of the site is given in Sangster et al. (2004).

In January 2004, the company began an exploration program designed in part to confirm the resource defined by previous exploration of the prospect. A cut grid was established over the entire property, including 50 m line spacing over known mineralized zones. MaxMin HLEM and magnetic ground geophysical surveys were completed over approximately 60 line-km. Additional VLF-EM surveys were completed in selected areas. The electromagnetic survey identified several strong conductors and exploration targets.

In the spring of 2004, the company drilled 5 diamond drill holes to confirm mineralization documented by previous diamond drilling, and 3 additional diamond drill holes to test the western extension of the geophysical conductor associated with the North Zone. The new diamond drilling confirmed the presence of nickel-copper mineralization in both the North and South Zones.

Gartner Lee Limited, environmental planning consultants, have been retained to guide the company through the regulatory process and community interaction (Limerick Mines Ltd., draft prospectus, 2004; personal communication, 2004).

Nickel - Copper - Cobalt - PGM

RANDSBURG INTERNATIONAL GOLD CORPORATION

In January 2004, Randsburg International Gold Corporation reported intersections of Ni-Cu-Co-PGE mineralization during a stage 2 diamond drill program conducted on the company's McClintock Township property. In the area known as the South Showing, numerous mineralized zones were reported in 6 diamond drill holes, including an 18 m mineralized section that assayed up to 1.09% nickel over 0.45 m. Following the successful completion of stage 2 diamond drilling in February, the company expanded on the deep-penetrating Time Domain EM helicopter airborne geophysical survey that was completed in 2003, by flying an additional 400 line-km survey. Results were encouraging and new diamond drill targets have been identified as well as improved definition to existing targets.

The company also completed down-hole EM geophysical surveys on all stage 2 diamond drill holes to further delineate the mineralized zones intersected and to help delineate off-hole higher-grade areas reported in historical drill logs. In 1959, drilling resulted in the discovery of a 15 foot zone of sulphides assaying 1.35% nickel, 0.20% copper and 0.098% cobalt.

In April 2004, Randsburg International Gold Corporation announced commencement of stage 3 diamond drilling on its McClintock Township property. A minimum 3000 m diamond drill program to test 6 target areas was planned.

The sulphide mineralization ranges from being weakly disseminated, to net textured, to massive and comprised of pyrrhotite, chalcopyrite, and exsolved and free pentlandite. Previously trenched mineralized surface exposures exhibit a pinch-and-swell appearance over a strike length of 1300 m and a width of at least 27 m.

In January 2005, Randsburg announced that the net proceeds of a recently closed flow-through offering would be used to fund exploration on several properties including McClintock Township (Randsburg International Gold Corporation, press releases, website, 2004, 2005).

Table 2. Exploration activity in the Southern Ontario Regional Resident Geologist (Southeast) District in 2004.

Abbreviations

AEM	Airborne electromagnetic survey	Lc	Linecutting
AM	Airborne magnetic survey	Met	Metallurgical testing
ARA	Airborne radiometric survey	OD	Overburden drilling
Beep	Beep Mat survey	ODH	Overburden drill hole(s)
Bulk	Bulk sampling	OMIP	Ontario Mineral Incentive Program
DD	Diamond drilling	OPAP	Ontario Prospectors Assistance Program
DDH	Diamond drill hole(s)	PEM	Pulse electromagnetic survey
DGP	Down-hole geophysics	PGM	Platinum group metals
GC	Geochemical survey	Pr	Prospecting
GEM	Ground electromagnetic survey	RES	Resistivity survey
GL	Geological survey	Samp	Sampling (other than bulk)
GM	Ground magnetic survey	Seismic	Seismic survey
GRA	Ground radiometric survey	SP	Self-potential survey
Grav	Gravity survey	Str	Stripping
HLEM	Horizontal loop electromagnetic survey	Tr	Trenching
HM	Heavy mineral sampling	UG	Underground exploration/development
IM	Industrial mineral testing and marketing	VLEM	Vertical loop electromagnetic survey
IP	Induced polarization survey	VLFEM	Very low frequency electromagnetic survey

No	Company/Individual (Occurrence Name) or Property	Township/Area Commodity)	Exploration Activity
1.	1447136 Ontario Inc.	Harvey (Limestone)	DD, Str, Tr, IM
2.	1447136 Ontario Inc.	Galway (Trap Rock)	Str, GL
3.	Baird, D., Neczkar, E.	Kaladar (Au)	Pr
4.	Baird, D., Neczkar, E.	Barrie (Au)	Pr
5.	Baird, D., Neczkar, E.	Marmora (Au)	Pr
6.	Barr, T.	Cardiff, Monmouth	Pr
7.	Blue Marble Mining Corp.	Anstruther, Galway, Cavendish (Vermiculite)	GL, Samp, Pr
8.	Bramham, M.D.	Monmouth (Mineral Specimens)	GL
9.	Butts, N.	Madoc (Marble)	Pr
10.	Byer, J.	Elzevir (Dimension Stone)	Str
11.	Canadian Wollastonite	Pittsburgh (Wollastonite)	Bulk, Met
12.	Canadian Wollastonite	Leeds and Lansdowne (Wollastonite)	Pr
13.	Catherwood, L. and L.	McKay (U)	Pr, Samp
14.	Chard, J.M., Dillman, R.J.	Tudor, Grimsthorpe (Au)	GL, Samp, Lc, Tr, Str
15.	Covington, E.	Loughborough	Pr
16.	Dacre Industrial Minerals Inc.	Griffith (Marble)	Str
17.	Despres, J., Trudeau, K., Creighton, W.	Elzevir (Soapstone)	Bulk, Str
18.	Dubblestein, A.	Ashby (Marble)	GL, Samp
19.	Farmery, D.	Lyndoch (Mineral Specimens)	Pr
20.	Floyd Preston Limited	Mayo (Marble)	DD, Samp, IM
21.	Forget, M.	Tudor (PGE)	Pr

No	Company/Individual (Occurrence Name) or Property	Township/Area Commodity)	Exploration Activity
22.	Forget, M.	Marmora (Fe)	Pr
23.	Fulton-Bell, Y.	Hindon (Cu)	Pr, Samp
24.	Fulton-Bell, Y.	Brougham (Dimension Stone)	Pr
25.	Graphite Mountain Inc.	North Burgess (Graphite)	Str, Tr
26.	Guillet, R.	Kaladar (Mica)	Samp
27.	IKO Industries Ltd.	Madoc (Trap Rock)	Pr
28.	Jones, F.E.	McClintock (Quartz)	Str
29.	Kretschmar, U.	Belmont (Marble, Silica)	Pr, GL, GM
30.	Kriens, P.	Tudor	Pr
31.	Laidlaw, J., Beesley, T.	Tudor (Au)	Pr
32.	Limerick Mines	Limerick (Base Metals)	Lc, GL, GM, Samp, DD
33.	Limerick Mines	Kaladar (Base Metals)	Pr
34.	McGill, M.K.	Galway (Vermiculite)	GEM
35.	OMYA (Canada) Inc.	Southeast Ontario (Marble)	Pr
36.	Palu-Corbelli Corporation	Kaladar (Dimension Stone)	Bulk
37.	Pelangio Mines Inc.	Denbigh, Lyndoch (Cu, Zn)	DD
38.	Rampton, V.N.	Lavant (Mica)	IM
39.	Rampton, V.N.	Darling (Au)	GC, Str, Tr
40.	Randsburg International Gold Corp.	McClintock (Base Metals, PGE)	DD
41.	Reed, A.	Madoc (Soil Conditioning)	Pr
42.	Regis Resources Inc.	Cavendish (Vermiculite)	IM, Samp, Pr
43.	Ross, D.J.	Cavendish (Mineral Specimens, REE)	Samp, Pr
44.	Sibley, K.	Matawatchan (Au, Base Metals)	Pr
45.	Skarn Co. Ltd.	Methuen, Dungannon, Olden (Dimension Stone)	Pr
46.	Smerchanski, R.G.	Cavendish (Vermiculite)	Pr, IM, Str, Tr, GL, Samp
47.	Smerchanski, R.G.	Cardiff (Mica, Vermiculite)	IM, Tr, GL
48.	Smerchanski, R.G.	Galway (Trap Rock)	Str, GL
49.	Smerchanski, R.G.	Harvey (Limestone)	DD, Str, Tr, GL
50.	Smerchanski, R.G.	Monmouth, Anstruther (Syenite, Amphibolite)	GL, Tr
51.	Solmes, S.	Elzevir (Soapstone)	Pr
52.	Trigan Resources Inc.	Methuen (Gabbro as Aggregate)	DD, IM
53.	Webster, D.N.	Galway (Mica, REE, Diamonds)	Bulk, IM, DD, Str, Samp, GC, GL
54.	Whotton, J.	Faraday (Au)	Pr

Figure 2: Exploration Activity in 2004- Southeast District, Southern Ontario Regional Resident Geologist

Figure 2: Exploration Activity in 2004- Southeast District, Southern Ontario Regional Resident Geologist

Table 3. Assessment files received in the Southern Ontario Regional Resident Geologist (Southeast Ontario) District in 2004.

Abbreviations

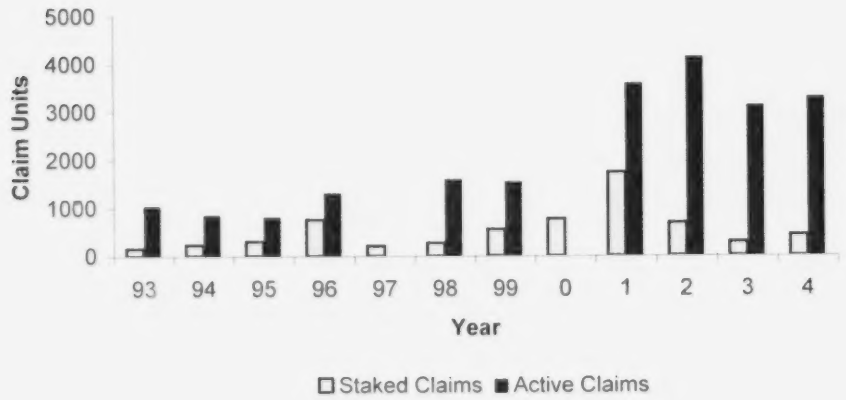
AEM ..... Airborne electromagnetic survey
AM ..... Airborne magnetic survey
ARA ..... Airborne radiometric survey
Beep ..... Beep Mat survey
Bulk ..... Bulk sampling
DD ..... Diamond drilling
DDH ..... Diamond drill hole(s)
DGP ..... Down-hole geophysics
GC ..... Geochemical survey
GEM ..... Ground electromagnetic survey
GL ..... Geological survey
GM ..... Ground magnetic survey
GRA ..... Ground radiometric survey
Grav ..... Gravity survey
HLEM ..... Horizontal loop electromagnetic survey
HM ..... Heavy mineral sampling
IM ..... Industrial mineral testing and marketing
IP ..... Induced polarization survey
Lc ..... Linecutting
Met ..... Metallurgical testing
OD ..... Overburden drilling
ODH ..... Overburden drill hole(s)
OMIP ..... Ontario Mineral Incentive Program
OPAP ..... Ontario Prospectors Assistance Program
PEM ..... Pulse electromagnetic survey
PGM ..... Platinum group metals
Pr ..... Prospecting
RES ..... Resistivity survey
Samp ..... Sampling (other than bulk)
Seismic ..... Seismic survey
SP ..... Self-potential survey
Str ..... Stripping
Tr ..... Trenching
UG ..... Underground exploration/development
VLEM ..... Vertical loop electromagnetic survey
VLFEM ..... Very low frequency electromagnetic survey

	Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
1.	Anstruther (Vermiculite)	Blue Marble Mining Corp.	2004	Pr, Samp, GL	2.28121	92
2.	Anstruther (Vermiculite)	Blue Marble Mining Corp.	2004	GL	2.27769	93
3.	Anstruther, Cavendish (Vermiculite)	Blue Marble Mining Corp.	2004	GL, Pr	2.28162	94, 134
4.	Ashby (Dolomite Marble)	A.J. Dubblestein	2003, 2004	GL, Samp	2.27734	18
5.	Cardiff (Mica, Vermiculite	R.G. Smerchanski	2004	GL	2.28964	230
6.	Cardiff (Mica, Vermiculite)	R.G. Smerchanski	2004	Tr, IM	2.28792	231
7.	Cavendish (Mineral Specimens, REE)	D.J. Ross	2004	Samp, Pr	2.28459	132
8.	Cavendish (Vermiculite)	R.G. Smerchanski	2003, 2004	Str, Tr, GL, Samp	2.27570	130
9.	Cavendish (Vermiculite)	Regis Resources Inc.	2003, 2004	Samp, IM, Pr	2.28159	131
10.	Cavendish (Vermiculite)	R.G. Smerchanski	2004	Pr, IM	2.28330	133
11.	Darling (Au)	V.N. Rampton	2004	GC	2.28787	82
12.	Darling (Au)	V.N. Rampton	2004	GC, Str, Tr	2.28749	83
13.	Denbigh, Lyndoch (Cu, Zn)	Pelangio Mines Inc.	2003	AEM, AM	2.26993	7, 43
14.	Elzevir (Aggregate)	J. Byer	2003	Str	2.27598	28
15.	Galway (Mica)	D.N. Webster	2002	Bulk, IM, Tr, DD	2.26555	52
16.	Galway (REE, Diamonds)	D.N. Webster	2003, 2004	Str, Samp	2.27232	55

	Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
17.	Galway (REE, Diamonds)	D.N. Webster	2004	Bulk	2.27705	56
18.	Galway (Trap Rock)	1447136 Ontario Inc.	2003	Str, GL	2.27048	53
19.	Galway (Trap Rock)	R.G. Smerchanski	2004	Str, GL	2.27346	57
20.	Galway (Trap Rock)	R.G. Smerchanski	2003	Str, GL	2.27228	58
21.	Galway (Trap Rock, Diamonds)	D.N. Webster	2003	Str, Bulk, Samp, GC, GL	2.26588	54
22.	Galway (Vermiculite)	Blue Marble Mining Corp.	2004	GL, Pr, Samp	2.28052	59
23.	Galway (Vermiculite)	Blue Marble Mining Corp.	2004	GL, Pr, Samp	2.28051	60
24.	Galway (Vermiculite)	M.K. McGill	2004	GEM	2.28541	61
25.	Griffith (Marble)	Dacre Industrial Minerals Inc.	2002, 2004	Str	2.28295	26
26.	Grimsthorpe (Au)	R.J. Dillman	2004	GL, Samp	2.28905	85
27.	Grimsthorpe (Diamonds)	Princess Emilia von Anhalt, Prinz Jurgen von Anhalt	2002	Samp	2.26742	82
28.	Grimsthorpe, Tudor (Diamonds)	Lydia Diamond Exploration of Canada Ltd.	2001-2003	Samp, GC	2.26551	81, 114
29.	Harvey (Limestone)	R.G. Smerchanski	2003	Str, Tr, GL	2.27231	17
30.	Harvey (Limestone)	1447136 Ontario Ltd.	2003	Str, Tr, IM	2.26969	18
31.	Harvey (Limestone)	1447136 Ontario Inc.	2004	DD	2.27691	19
32.	Harvey (Limestone)	R.G. Smerchanski	2004	DD	2.27693	20
33.	Hindon (Base Metals)	Y.C. Fulton-Bell	2003	Pr, Samp	2.27172	9
34.	Hindon (Base Metals)	Y.C. Fulton-Bell	2003, 2004	Pr	2.28048	10
35.	Kaladar (Dimension Stone)	Palu-Corbelli Corporation	2004	Bulk	2.28878	72
36.	Lavant (Muscovite)	V.N. Rampton	2004	IM	2.28628	59
37.	Limerick (Ni, Cu)	Limerick Mines Limited	2004	DD, Samp	2.27709	14
38.	Limerick (Ni, Cu)	Limerick Mines Limited	2004	GM	2.28708	15
39.	Limerick (Ni, Cu)	Limerick Mines Limited	2004	Lc, GL	2.28695	16
40.	Loughborough	E. Covington	2002-2004	Pr	2.28602	4
41.	Madoc (Soil Conditioner)	A. Reed	2004	Pr	2.27985	153
42.	Mayo (Marble)	Floyd Preston Limited	2003	DD, Samp, IM	2.26908	25
43.	McClintock (Base Metals, PGM)	Randsburg International Gold Corp.	2003	DD	2.27062	61
44.	McClintock (Base Metals, PGM)	Randsburg International Gold Corp.	2004	DD	2.28578	62
45.	McClintock (Base Metals, PGM)	Randsburg International Gold Corp.	2004	DD	2.28766	63

	Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
46.	McKay (U)	L. and L. Catherwood	2002, 2003	Pr. Samp	2.28128	1
47.	Monmouth (Mineral Specimens)	M. Bramham	2004	GL	2.28130	160
48.	Monmouth, Anstruther (Syenite, Amphibolite)	R.G. Smerchanski	2002, 2003	GL, Tr	2.27273	159, 91
49.	North Burgess (Graphite)	Graphite Mountain Inc.	2004	Str, Tr	2.28601	24
50.	Tudor (Au)	R.J. Dillman, J. Chard	2004	Samp, GL, Lc, Tr, Str	2.28760	120
51.	Tudor (Diamonds)	Lydia Diamond Exploration of Canada Ltd.	2001, 2002	DD	2.26745	112
52.	Tudor (Diamonds)	Lydia Diamond Exploration of Canada Ltd.	2002	Str, Tr, GL	2.26527	113
53.	Tudor (Diamonds)	Lydia Diamond Exploration of Canada Ltd.	2002	GL	2.28380	118
54.	Tudor (Diamonds)	Lydia Diamond Exploration of Canada Ltd.	2002	Samp	2.28426	119
55.	Tudor (Gold)	R.J. Dillman, J. Chard	2003	GEM	2.27324	115
56.	Tudor, Grimsthorpe (Diamonds)	Lydia Diamond Exploration of Canada Ltd.	2002	Str, Tr	2.26693	116, 83
57.	Tudor, Grimsthorpe (Diamonds)	Lydia Diamond Exploration of Canada Ltd.	2002	Microscope Study	2.26685	117, 84

Table 4. Claims recorded from 1993 to 2004 – southern Ontario.



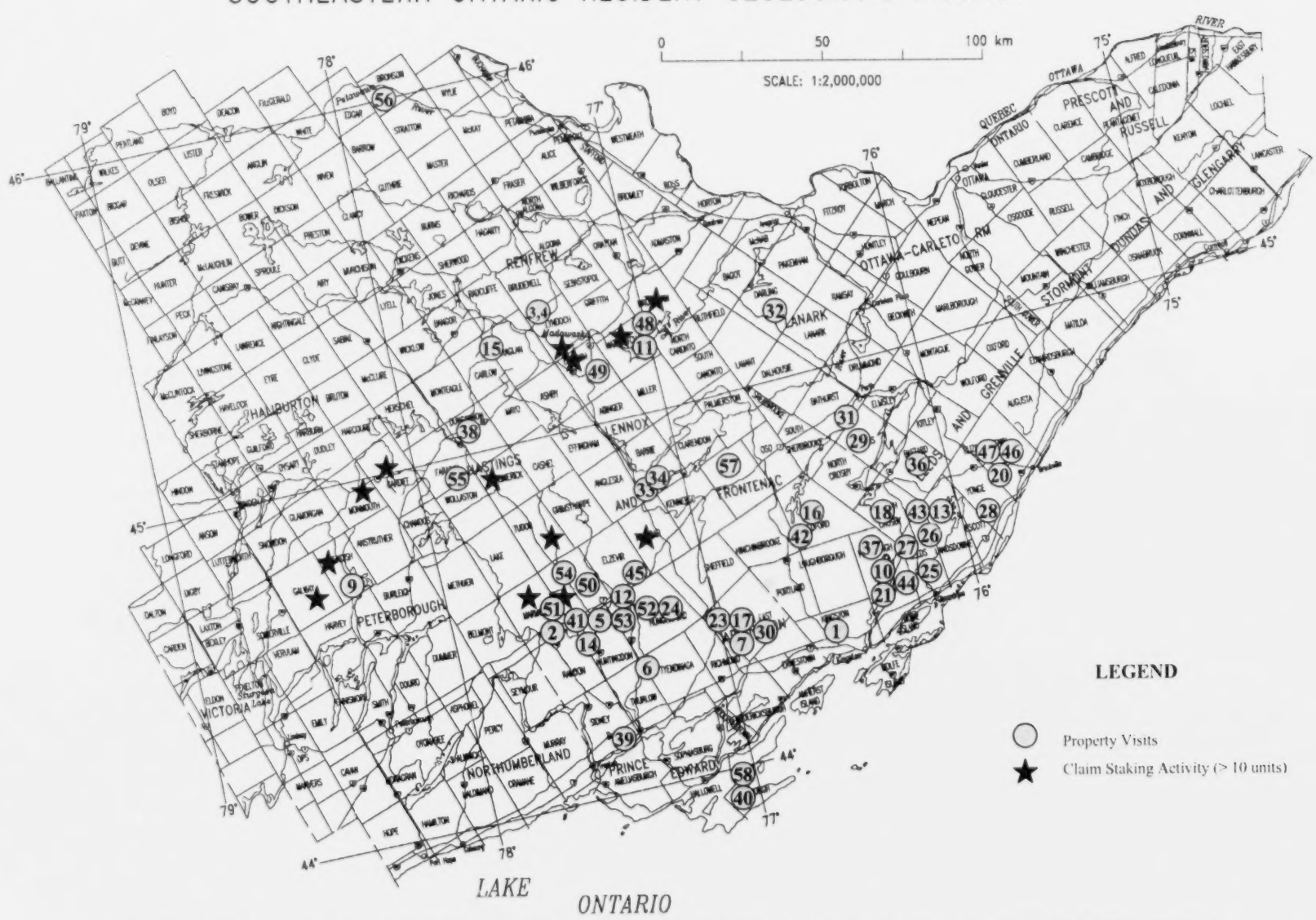


Figure 3: Property Visits and Claim Staking Activity in 2004- Southeast District, Southern Ontario Regional Resident Geologist

Figure 3: Property Visits and Claim Staking Activity in 2004- Southeast District, Southern Ontario Regional Resident Geologist

LAND USE PLANNING ACTIVITY

Ministry of Municipal Affairs and Housing

The mineral-related Provincial Policy Statement contained within the *Planning Act* requires the Ministry of Northern Development and Mines (MNDM) to provide comment and input into the development of municipal Official Plans (OP) and Official Plan Amendments (OPA) through the Ministry of Municipal Affairs' (MMA) one-window approac[1]. A summary of Tweed RGPO's Official Plan related activities is shown in Table 5.

For additional information on land use planning activity related to the Southeast Ontario District, the reader is directed to the report by D.J. Rowell in Debicki et al. (2004). Mr. Rowell is responsible for land use planning issues and initiatives in southern Ontario south of the French River and Manitoulin Island.

Table 5. Municipal planning activity 2004 – Southern Ontario Regional Resident Geologist (Southeast) District. (Abbreviations: AMIS = Abandoned Mines Information System; OP = official plan; OPA = official plan amendment; PSMP = provincially significant mineral potential.)

County	Municipality	Activity
Haliburton	Minden Hills	OP input – PSMP Snowdon Tp.
Haliburton	Highlands East	OP Review
Haliburton	Minden Hills	AMIS data review
Haliburton	Algonquin Highlands	AMIS data review
Hastings	Marmora Township	Severance/AMIS conflict
Lanark	Mississippi Mills	Draft OP review
Lanark	Town of Carleton Place	OP Review
Lanark	Lanark Highlands	Severances/PSMP
Leeds and Grenville	Edwardsburgh/Cardinal	Draft OP
Leeds and Grenville	Elizabethtown Township - Kitley	Severance/AMIS conflict
Leeds and Grenville	Elizabethtown Township - Kitley	OP / AMIS review
Leeds and Grenville	North Crosby	Severance
Lennox and Addington	Addington Highlands	OP / AMIS review
Northumberland	Port Hope	Draft OP
Northumberland	Hope	Draft OP review
Northumberland	Hamilton Township	OP Review
Peterborough	Peterborough	OPA
Renfrew	Brudenell, Lyndoch and Raglan	Consent
Stormont, Dundas and Glengarry	Stormont, Dundas and Glengarry	2nd Draft OP
Victoria	Kawartha Lake	Draft OP

The Regional Resident Geologist (RRG) and the District Geologist (DG) from the Tweed RGPO attended a number of inter-ministerial meetings hosted by the MMA to review current municipal official plans and related planning issues. The RRG also represented MNDM at meetings and workshops in Kingston and Ottawa hosted by MMA, to assess proposed changes to the Provincial Policy Statement under the *Planning Act*, and proposed changes to the Ontario Municipal Board.

RESIDENT GEOLOGIST PROGRAM STAFF AND ACTIVITIES

During 2004, staff of the Southern Ontario Regional Resident Geologist (Southeast) office included P.J. Sangster, Regional Resident Geologist; V.C. Papertzian, Southeast District Geologist; and D.A. Laidlaw, Southeast District Support Geologist. L. Palmateer provided office support for 4 months under a co-operative education program through the Hastings and Prince Edward district school board. Ms. Palmateer also participated in the summer, and M. LeSage provided summer field season support to the Tweed RGPO under the 2004 Experience Program.

There are over 6800 Mineral Deposit Inventory (MDI) records that relate to the Southeast Ontario District. During 2004, the District Support Geologist was primarily responsible for verifying the MDI database. In 2004, 469 MDI files were reviewed and revised. Other staff continued to add information related from field investigations and property visits.

In January 2004, the District Geologist attended the Cordilleran Roundup in Vancouver and provided a southern Ontario perspective at the Ministry of Northern Development and Mines (MNDM) poster session.

In March, the "Southern Ontario Mineral Potential and Recommendations for Exploration" were presented at the Prospectors and Developers Association convention in Toronto as part of the Ontario Geological Survey poster session.

In April, the Regional Resident Geologist attended the Northeastern Ontario Mines and Minerals Symposium held in Sudbury. Both a poster and talk were presented on "Southern Ontario Mineral Industries". J.W. Newsome, RGP Senior Manager, presented the southern Ontario talk and poster session at the Northwestern Ontario Mines and Minerals Symposium in Thunder Bay.

In May, both the Regional Resident Geologist and the District Support Geologist attended the Ontario Small Urban Municipalities Conference in Owen Sound for 2 days. A poster session was presented at this conference.

P. Hinz, Kenora District Geologist, visited the southern Ontario region in late July for 2 weeks to tour and gain insight into the industrial minerals industry.

The 41st Annual Bancroft Gemboree was attended by the Southern Ontario RGP staff in early August. The booth was shared with the Southern Ontario Prospectors Association (SOPA). A poster session was presented and an educational rock and mineral collecting exercise proved to be very popular with the children and adults in attendance.

In September, the RGP staff presented a poster display at the Ontario East Municipal Conference. The poster display focussed on land use planning and mining in southern Ontario.

In November, the District Support Geologist attended the GIS Rural/Municipal Expo in Cornwall. The one-day exhibit and talk showcased GIS applications related to the environment, agriculture, natural resources and LIDAR (Light Detection and Ranging) topographic mapping.

In December, staff attended the Ontario Prospectors Association symposium in Toronto, where a poster display entitled "Southern Ontario Mineral Treasures – Building the Future" was presented. In addition, the District Support Geologist attended a one-day workshop on Applications of Remote Sensing to Mineral Exploration, held in conjunction with the symposium.

During the course of the year, 57 assessment reports were processed and added to the Tweed RGP office assessment file library, as outlined in Table 3.

Table 6 provides a listing of the 58 field visits completed by the Tweed RGPO staff during 2004.

Table 6. Field visits completed in 2004 – Southern Ontario Regional Resident Geologist (Southeast) District. (Field visits within the District are keyed to Figure 3.)

No.	Property/Operation	Commodity
1.	Abbey Dawn Road, Kingston Tp.	Scientific interest
2.	Ackerman Mine, Marmora Tp.	Gold – past producer
3.	AquaRose Beryl Pit, Lyndoch Tp.	Mineral specimens
4.	AquaRose Quarry, Lyndoch Tp.	Rose quartz, mineral specimens
5.	Blakely Fluorite Mine, Huntingdon Tp.	Fluorite – past producer
6.	C. MacLean property, Tyendinaga Tp.	Limestone, fossil specimens
7.	Camden Quarry, Camden Tp.	Limestone
8.	Canadian Colour Rock Inc., Quarry, Manitoulin Island	Limestone
9.	Canadian Vermiculite, Cavendish Tp.	Vermiculite
10.	Canadian Wollastonite, Pittsburgh Tp.	Wollastonite
11.	Centennial Lake ANSI, Matawachan Tp.	Land use planning with MNR
12.	Champlain Marble, Tweed Marble Quarry, Hungerford Tp.	Marble dimension stone
13.	Charleston Lake, Rear of Leeds and Lansdowne Tp.	Sandstone, Potsdam Fm.
14.	Coe Fluorite Mine, Huntingdon Tp.	Fluorite – past producer
15.	Craigmont Mine, Raglan Tp.	Corundum – past producer
16.	Desert Lake, Bedford Tp.	Graphite
17.	Doupe Quarry, Camden Tp.	Limestone
18.	Elgin, South Crosby Tp.	Sandstone, Potsdam Fm.
19.	Fossil Hill Formation occurrence, Manitoulin Island	Fossils, chert
20.	Jones Creek, Elizabethtown Tp.	Sandstone, Potsdam Fm.
21.	Joyceville, Pittsburgh Tp.	Sandstone, Potsdam Fm.
22.	Lafarge Canada Inc., Meldrum Quarry, Manitoulin Island	Amabel Formation, dolostone
23.	Lafarge Canada Inc., Quarry, Camden Tp.	Limestone
24.	Lajoie, Quarry, Hungerford Tp.	Limestone – past producer
25.	Lansdowne, Front of Leeds and Lansdowne Tp.	Sandstone, Potsdam Fm.
26.	Long Point Mine, Rear of Leeds and Lansdowne Tp.	Lead
27.	Lyndhurst, Rear of Leeds and Lansdowne Tp.	Sandstone
28.	Mallorytown glassworks, Front of Yonge Tp.	Glassworks – past producer
29.	Mill Pond Quarry, Burgess Tp.	Aggregate – past producer
30.	Newburgh Quarry, Camden Tp.	Limestone
31.	OMYA Canada Inc., Perth Plant and water intake site, Bathurst Tp.	Calcium carbonate
32.	OMYA Canada Inc., Quarry, Darling Tp.	High purity marble
33.	Ore Chimney Prospect, Barrie Tp.	Gold
34.	Ore Mountain Mine, Barrie Tp.	Gold – past producer
35.	Owen Sound Ledgerock Ltd., plant and quarry, Owen Sound	Dimension stone - dolostone
36.	Phillipsville Escarpment, Bastard Tp.	Scientific interest
37.	Pitts Ferry, Pittsburgh Tp.	Sandstone, Potsdam Fm.
38.	Princess Sodalite Mine, Dungannon Tp.	Sodalite

No.	Property/Operation	Commodity
39.	Quinte Conservation Centre, Belleville	Education
40.	Quinte Conservation Centre, Picton	Education
41.	Reynolds North Property, Huntingdon Tp.	Mineral specimens
42.	Richardson Mine, Bedford Tp.	Feldspar – past producer
43.	Rideauview Contracts Ltd., Ellisville Quarry, Rear of Leeds and Lansdowne Tp.	Sandstone
44.	Rideauview Contracts Ltd., Sloan Quarry, Pittsburgh Tp.	Sandstone
45.	Senator Stone, CarbRoc Quarry, Elzevir Tp.	Marble, crushed stone
46.	Sherwood Spring, Elizabethtown Tp.	Sandstone, Potsdam Fm.
47.	Shipman Mine, Elizabethtown Tp.	Pyrite
48.	Sibley Prospect, Brougham Tp.	Anorthosite, dimension stone
49.	Sibley Prospect, Denbeigh Tp.	Garnet
50.	Sophia Diamond Mine, Madoc Tp.	Gold – past producer
51.	Stoklosar Quarry, Marmora Tp.	Marble
52.	Trudeau Prospect, Hungerford Township	Limestone boulders / landscape stone
53.	Trudeau Quarry, Hungerford Tp.	Gravel / limestone
54.	Upper Canada Stone Company Ltd., Plant, Madoc Tp.	Marble, terrazzo
55.	Whotton property, Faraday Tp.	Mineral specimens – Cu, Fe, tourmaline
56.	Renfrew, Horton Tp.	Copper, nickel
57.	Long Lake Zinc, Olden Tp.	Calcite
58.	Essroc Picton Quarry, Sophiasburgh Tp.	Cement, kimberlite

Table 7. Program statistics (5 year summary) – Southern Ontario Regional Resident Geologist (Southeast) District.

Activity	2000	2001	2002	2003	2004
Field Investigations/Property Visits	47	44	45	44	58
Field Trips Given/Field Guide Written	1	3	3	2	1
MDI Records Revised	2690	906	481	470	469
OPAP Recipients/OEC Grant Recipients	N/A	N/A	N/A	4	3
MMAH Presentations	2	4	2	4	2
Clients Visits to Tweed RGP Office	676	496	428	470	461
Drill Core Library Users	31	58	17	26	142
Client Communications/Interactions (Presentations/Poster Sessions)	2619	>3000	2550	2550	>3000
Client Inquiries (Telephone/E-mail/Mail)	2163	2668	2400	2461	2498
OGS Publications Sold	93	89	108	62	84
Prospector's Licenses Sold	21	15	14	20	14
Claim/Line Tags Sold	261	742	131	27	293

Table 8. Library acquisitions in 2004 – Southern Ontario Regional Resident Geologist (Southeast) District. (OGS publications of particular interest to the Southeast Ontario District are shown in bold.)

Title	Author	Type and Year of Publication
Canadian & American Mines Handbook 2004-2005	Giancola, D. (ed.)	Business Information Group, Toronto, 600p. 2004
Innovations in Watershed Stewardship (6 volumes) Phase I – Pilot Project		Ontario Ministry of Natural Resources, 2004
Airborne Gamma Ray Spectrometry Compilation, equivalent Uranium, Central Metasedimentary Belt, (Grenville Province), Ontario-Quebec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A., and Shives, R.B.K.	Geological Survey of Canada, Open File 4559, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, equivalent Thorium, Central Metasedimentary Belt, (Grenville Province), Ontario-Quebec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A., and Shives, R.B.K.	Geological Survey of Canada, Open File 4560, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, Natural Air Absorbed Dose Rate, Central Metasedimentary Belt, (Grenville Province), Ontario-Quebec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A., and Shives, R.B.K.	Geological Survey of Canada, Open File 4557, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, Potassium, Central Metasedimentary Belt, (Grenville Province), Ontario-Quebec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A., and Shives, R.B.K.	Geological Survey of Canada, Open File 4558, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, eU/eTh ratio, Central Metasedimentary Belt, (Grenville Province), Ontario-Quebec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A., and Shives, R.B.K.	Geological Survey of Canada, Open File 4561, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, eU/K ratio, Central Metasedimentary Belt, (Grenville Province), Ontario-Quebec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A., and Shives, R.B.K.	Geological Survey of Canada, Open File 4562, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, eTh/K ratio, Central Metasedimentary Belt, (Grenville Province), Ontario-Quebec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A., and Shives, R.B.K.	Geological Survey of Canada, Open File 4563, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, Ternary Radioelement Map, Central Metasedimentary Belt, (Grenville Province), Ontario-Quebec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A., and Shives, R.B.K.	Geological Survey of Canada, Open File 4564, scale 1:250 000, 2004
Report of Activities 2003, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts	Lichtblau, A., Hinz, P., Ravnaas, C., Storey, C.C., Kosloski, L., and Raoul, A.	Ontario Geological Survey, Open File Report 6127, 104p, 2004
Report of Activities 2003, Resident Geologist Program, Thunder Bay North Regional Resident Geologist Report: Thunder Bay North District	Smyk, M., White, G.D., Magee, M.A., and Komar, C.	Ontario Geological Survey, Open File Report 6128, 43p, 2004
Report of Activities 2003, Resident Geologist Program, Thunder Bay South Regional Resident Geologist Report: Thunder Bay South District	Schnieders, B.R., Scott, J.F., O'Brien, M.S., Magee, M.A., and Komar, C.	Ontario Geological Survey, Open File Report 6129, 39p, 2004
Report of Activities 2003, Resident Geologist Program, Timmins Regional Resident Geologist Report: Timmins and Sault Ste. Marie Districts	Atkinson, B.T., Hailstone, M., Seim, G.Wm., Wilson, A.C., Draper, D.M., Butorac, S., and Cooper, G.R.	Ontario Geological Survey, Open File Report 6130, 87p, 2004
Report of Activities 2003, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake District	Meyer, G., Grabowski, G.P.B., Guindon, D.L., and Chaloux, E.C.	Ontario Geological Survey, Open File Report 6131, 52p, 2004

Title	Author	Type and Year of Publication
Report of Activities 2003, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre	**Sangster, P.J., Farrow, D., Papertzian, V.C., Lee, C., Barua, M., Laidlaw, D.A., Hemmings, D., and Carter, T.R.**	**Ontario Geological Survey, Open File Report 6132, 83p, 2004**
Report of Activities 2003, Resident Geologist Program, Regional Land Use Geologist Report: Northwestern, Northeastern and Southern Ontario Regions	**Debicki, R.L., Drost, A.P., Fraser, R.J., Rowell, D.J., and Yule, G.R.**	**Ontario Geological Survey, Open File Report 6133, 35p, 2004**
Industrial Minerals 2004 – the Sixteenth Annual Canadian Conference on Markets for Industrial Minerals		Proceedings, Blendon Information Services, Toronto, 2004
Report of Activities 2003, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Sudbury District	Cosec, M., Gaudreau, J.M., Selway, J.B., and Beauchamp, S.A.	Ontario Geological Survey, Open File Report 6139, 33p, 2004
A Comparison of Selective Leach Signatures over Kimberlites and Other Targets	Burt, A.K., and Hamilton, S.M.	Ontario Geological Survey, Open File Report 6142, 179p, 2004
Lithofacies and Geochemistry of the Lucas Formation in the Subsurface of Southwestern Ontario: A High-Purity Limestone and Potential High-Purity Dolostone Resource	Birchard, M.C., Rutka, M.A., and Brunton, F.R.	Ontario Geological Survey, Open File Report 6137, 180p, 2004
Summary of Field Work and Other Activities 2004	**Baker, C.L., Debicki, E.J., Parker, J.R., Kelly, R.I., Ayer, J.A., and Easton, R.M.**	**Ontario Geological Survey, Open File Report 6145, 479p, 2004**
Aggregate Resources Inventory of the Huron County	Ontario Geological Survey	Ontario Geological Survey, Aggregate Resources Inventory Paper 177, 78p, 2004
Sand and Gravel Resources, Huron County (Northern Sheet, Former Townships of Ashfield, West Wawanosh, East Wawanosh and Colborne)	Ontario Geological Survey	Ontario Geological Survey, Aggregate Resources Inventory Map 177-1A, scale 1:50 000, 2004
Bedrock Resources, Huron County (Northern Sheet, Former Townships of Ashfield, West Wawanosh, East Wawanosh and Colborne)	Ontario Geological Survey	Ontario Geological Survey, Aggregate Resources Inventory Map 177-2A, scale 1:50 000, 2004
Sand and Gravel Resources, Huron County (Northeastern Sheet, Former Townships of Turnberry, Howick, Morris and Grey)	Ontario Geological Survey	Ontario Geological Survey, Aggregate Resources Inventory Map 177-1B, scale 1:50 000, 2004
Bedrock Resources, Huron County (Northeastern Sheet, Former Townships of Turnberry, Howick, Morris and Grey)	Ontario Geological Survey	Ontario Geological Survey, Aggregate Resources Inventory Map 177-2B, scale 1:50 000, 2004
Sand and Gravel Resources, Huron County (Central Sheet, Former Townships of Goderich, Hullett, McKillop, Stanley and Tuckersmith)	Ontario Geological Survey	Ontario Geological Survey, Aggregate Resources Inventory Map 177-1C, scale 1:50 000, 2004
Bedrock Resources, Huron County (Central Sheet, Former Townships of Goderich, Hullett, McKillop, Stanley and Tuckersmith)	Ontario Geological Survey	Ontario Geological Survey, Aggregate Resources Inventory Map 177-2C, scale 1:50 000, 2004
Sand and Gravel Resources, Huron County (Southern Sheet, Former Townships of Hay, Usborne and Stephen)	Ontario Geological Survey	Ontario Geological Survey, Aggregate Resources Inventory Map 177-1D, scale 1:50 000, 2004
Encyclopedia of Mineral Names	Blackburn, W.H., and Dennen, W.H.	Mineralogical Association of Canada, The Canadian Mineralogist, Special Publication 1, Ottawa, 360p, 1997
Glossary of Mineral Synonyms	De Fourestier, J.	Mineralogical Association of Canada, The Canadian Mineralogist, Special Publication 2, Ottawa, 435p, 1999

Title	Author	Type and Year of Publication
Industrial Minerals 2003 - the Fifteenth Annual Canadian Conference on Markets for Industrial Minerals		Blendon Publication, Vancouver, 2003
Pontypool "Golden Spike" Borehole Digital Data Compilation, Sedimentological and Geophysical Data	Russell, H.A.J., Sharpe, D.R., and Hunter, J.	Geological Survey of Canada, Open File 4540, CD-ROM, 2004
Geochemical Data for Selective Leach Signatures over Kimberlites and Other Targets	Ontario Geological Survey	Ontario Geological Survey, Miscellaneous Release – Data 136, CD-ROM, 2004
Mineral Deposit Inventory Version 2 (MDI2) – October 2004 Release		**Ontario Geological Survey, CD-ROM, 2004**
Petrology and Mineralization of the Tanco Rare-Element Pegmatite, Southeastern Manitoba (Field Trip A3)	Cerny, P., Ercit, T.S., and Vanstone, P.T.	Geological Association of Canada, Winnipeg Section, Field Trip Guidebook, 63p, 1996
Miscellaneous Samples, 2003	Wilson, G.C.	Turnstone Geological Services, Campbellford, Ontario, 32p, 2003
Indiana Limestone Handbook, 21st Edition		Indiana Limestone Institute of America, Inc., Bedford, Indiana, 144p, 2002
Geoscience Reporting Guidelines	Grant, B.	Victoria, British Columbia, 356p, 2003

Southern Ontario Prospector's Association

During 2004, the Tweed Resident Geologist Program Office (RGPO) continued regular liaison with the Southern Ontario Prospector's Association (SOPA) to provide improved service to the client group. During the year the Tweed RGPO organized and co-hosted 2 workshops on GPS applications in mineral exploration and dimension stone sampling. Additional sessions provided SOPA members with an update on industrial mineral activities in southern Ontario and program planning within the Ontario Geological Survey. Guest speakers included staff from the Precambrian Geoscience Section and the Sedimentary Geoscience Section. Additional speakers included S. Waldie from the Ontario Exploration Corporation and J. Etches from the Ministry of Natural Resources.

Staff from the RGO and SOPA volunteers presented a cooperative booth highlighting mineral resources at the 2004 Bancroft Gemboree. The event recorded over 16 000 attendees.

PROPERTY EXAMINATIONS

Craigmont Corundum Mine

The Craigmont Corundum Mine is located in Renfrew County, Raglan Township, Concessions 18 and 19, Lots 3 and 4, 45° 18' 04" latitude, 77° 36' 43" longitude. The property is accessed by a gravel road that extends 2 km southeast from Highway 517 immediately west of the Raglan-Carlow townships boundary. The mine workings are on the south and west faces of Robillard Mountain.

Brief Property History:

1899 - Property leased to J.H. Shewstone and B.A.C. Craig of the Canada Corundum Company;
1900 - Mining commenced. A 200 ton per day mill was installed and operated until 1908;
1908 - The Canada Corundum Company was reorganized as the Manufacturers Corundum Company;
1913 - Mill burnt and operations ceased;
1919 - Corundum Limited leased the property and built a mill to treat the tailings and operated until 1921; and
1944 -The Wartime Metals Corporation operated a 200 ton per day plant to treat tailings until 1946.

The property was visited on April 21, 2004. Numerous open-cuts (greater than 20 feet long) and 2 large pits that represent the main mine workings were examined. One open pit measures 500 feet in length, up to 100 feet in width and has a maximum depth of 50 feet. The other open pit, referred to as the 'Klondike' workings, measures 320 feet in length, has a maximum width of 100 feet and a maximum depth of 60 feet. Most of the cuts are 15 to 20 feet long and 2 to 10 feet deep. Generally, the old mine workings are water filled and largely overgrown. There is also an adit associated with the property that was not investigated. It is reported to trend north for 220 feet, then west for approximately 150 feet, southward for another 70 feet and finally northwest for another 50 feet.

Production from 1900 to 1941 was 20 758 tons of corundum at a value of $1 224 473.

Carlson (1953) described the geology as follows:

> "The rocks exposed in the Klondike and Craigmont cuts may be divided into the following groups:
> 1) Granite and syenite pegmatites
> 2) Granite gneiss
> 3) Syenite gneiss:
> a) quartz-albite syenite with arfvedsonite
> b) Hybrid, pink-buff alkaline syenites
> 4) Leucocratic nepheline gneiss
> 5) Scapolite gneiss
> 6) Oligoclase-andesine gneiss (grey alkaline syenite)
> 7) Amphibolites.
>
> Corundum is found in the nepheline gneiss, the scapolite gneiss, the oligoclase-andesine gneiss and in hybrid altered facies of these rocks, which occur along their contacts with the hybrid pink-buff alkaline syenites. All of these rocks, except the pegmatites and the arfvedsonite syenite, have for the most part, gneissic fabrics and occur in irregular bands conformably intercalated with one another. The attitude of the banded structure of the sequence is roughly parallel to the southern slope of Robillard Mountain; in general it strikes a little north of west and dips from 20°- 40° S., the average dip being about 30°, with minor, local open folding evident in some places."

Hewitt (1954) describes the corundum as follows:

> "It occurs both as round anhedral porphyroblastic grains and stubby euhedral, hexagonal, barrel-shaped crystals. The colour ranges from bronze to green to dark grey. The grains range from 1 mm to 8 cm in size. Thin mantles of muscovite frequently surround the corundum. The following accessory minerals can be found in the corundum-bearing rocks: biotite, hornblende, pyroxene, muscovite, sphene (titanite), apatite, zircon, carbonate, sericite, chlorite, epidote, garnet, pyrite, zeolites, magnetite, and ilmenite. The nepheline gneiss contains a few grains of sodalite."

In 1949, L. Moyd (Moyd, 1949) estimated that only 10% of the deposit had been mined. He anticipated that 3 000 000 tons remained and from that, 200 000 tons of concentrate could be produced at a grade of 6.6%. The corundum content of the ore was highly variable and only the richest areas were extracted close to the surface.

Ore Mountain Gold Mine

The Ore Mountain Gold Mine is located in Lennox and Addington County, Barrie Township, Concession 1, Lots 31 and 32, 44° 46' 43" latitude, 77° 07' 24" longitude. The property is accessed via highway 41, north of Northbrook, turning east onto the Harlowe road and then proceeding 3.5 km to a laneway on the south side of the road.

This property was visited on October 1, 2004 in the company of the MNDM's Mine Hazards Co-ordinator, D. Cranston. Of interest was an exploration shaft that measures approximately 3 m square by 15 m deep that was excavated along with another small shaft and numerous exploration pits in 1914-1915 on Lot 31. In 1961, the Ore Mountain Mining Company charter was cancelled. The property was re-staked in 1980 and some geological mapping, minor stripping, trenching, sampling and a magnetometer survey were conducted.

The geology from north to south is briefly described as follows (Dillon 1985):

A – Amphibolite, amphibolite gneiss - Tudor formation
B – Hornblende-biotite-garnet schist - Ore Chimney Formation
C – Quartzite - Bishops Corners Formation
D – Quartzite pebble conglomerate – Bishops Corners Formation

The formations are roughly east trending. The shaft is located along the boundary of the amphibolite, amphibolite gneiss and hornblende-biotite-garnet schist.

Dillon (1985) describes the mineralization near the main shaft as follows:

> "The mineralization exposed on the Ore Mountain property consists of pyrite and minor arsenopyrite associated with a narrow zone (0.5 to 1.5 m) of quartz stringer veins hosted in a dark grey to black amphibolite-biotite schist. The quartz veins and well-developed foliation within the schist host rocks trend parallel to the regional foliation directions, which trend (070 to 085°) and 70 to 85° north. At the main shaft site discontinuous quartz stringers, 2-8 cm wide are exposed across approximately 1 m of the shaft. The host rocks appear to become more micaceous in the footwall of the veins whereas the hanging wall consists of an amphibolite showing relict feldspar porphyroblasts. Pyrite, arsenopyrite and minor magnetite are disseminated within the hornblende-biotite schist with lesser amounts of pyrite and traces of magnetite disseminated in the amphibolite hanging wall of the trench. No gold was visible in the trench material. Although pyrite and arsenopyrite are disseminated in host and wall rocks much of it is localized along margins of quartz stringers within sheared hornblende-biotite schist."

This property is approximately 1.5 km east along strike from the Ore Chimney Gold Mine. Dillon (1985) states that

> "The structural and stratigraphic setting of this mineralization resembles that of the Addington and Ore Chimney properties although the extent of shear zone development, quartz vein formation and associated sulphides +/- gold concentration appears to be less."

A gold value of 0.38 ounces per ton was obtained from a grab sample north of the shaft in 1983. This is the best assay reported from the property to date.

Potsdam Sandstone Investigation

Projected figures for 2003 show that Ontario sandstone quarries produced 17 000 tonnes of stone valued at $3.34 million. This value shows a marked increase over the $2.25 million quoted for value of sandstone production in 2002. The principal sandstone quarrying areas in Ontario are in the Limehouse-Georgetown-Inglewood area, northwest of Toronto, where Whirlpool sandstone is extracted, and in the Kingston area where Potsdam sandstone is quarried. In 2004, the demand for sandstone surpassed the supply and the trend is expected to continue. In recent years, RGO staff has received many requests for sandstone prospects.

Cambrian age Potsdam sandstone outcrops on both sides of the Frontenac axis north of Kingston, from Brockville to Westport in the Perth and Carleton Place areas, and near Ottawa.

In southeasten Ontario sandstone has been widely used as a building stone due to the ready availability of Potsdam sandstones in the vicinity of Kingston and Ottawa. There has been a building stone industry in eastern Ontario since the early 1800s. Impetus was given to the development of quarries by the construction of forts during the War of 1812 and by the construction of the Rideau canal between 1827 and 1832. The project employed many European stone masons to quarry stone and build dams, locks and retaining walls. Many of these masons subsequently settled in eastern Ontario.

Quarrying of the Potsdam sandstone around Kingston led to the use of salmon "Kingston Hue" facing stone in many churches, municipal buildings and private homes. In Perth, the Potsdam sandstone was locally available in grey and mottled purple. Much of the downtown and many historic residences are an enduring testament to this attractive stone.

Dimension stone studies completed by the Tweed RGO in the 1980s concentrated on evaluation of the granite and marble potential in southeastern Ontario. During the 2004 field season, a project was initiated to identify potential new areas for sandstone extraction. A total of 10 sites were selected for field investigation, including 2 active quarries, following a literature review and research of MDI files. Each site was accurately located using GPS, samples were collected and a description of the site was completed for addition to the Tweed MDI database. Digital photographs were also taken of each location for addition to the database.

Rideauview Contracts Ltd. currently extracts sandstone from the Ellisville and Sloan quarries near Kingston. The Sloan quarry is located in Storrington Township near Joyceville. Access to the property requires permission from both the surface rights holder and quarry operator. There are several quarry openings on the property exposing a medium- to thin-bedded salmon-coloured sandstone. Spectacular cross bedding is common. The Ellisville quarry is located in the Rear of Leeds and Lansdowne Township north of Gananoque. Cream, lilac and salmon-coloured sandstone is quarried to produce flagstone, blocks and landscape stone. An on-site plant has equipment to cut, guillotine, split and tumble stone to specification.

Additional sampling and examination of sites in the Kingston and Perth areas is planned for 2005.

Limestone Quarry Investigation

An ultramafic kimberlite dike intrudes middle Ordovician limestone at Essroc's quarry located near the town of Picton. Another micaceous kimberlite dike is exposed at the northwest corner of Varty Lake, northeast of the city of Napanee. The 2 dikes appear to trend normal to north-northeast-trending regional faults (Barnett et al. 1984). The District Support Geologist and summer experience student conducted an inspection of abandoned limestone quarries located along this trend in order to investigate whether there were any additional occurrences of kimberlite in the area and to update the mineral deposit database. The first phase of the inspection covered selected quarries located in the vicinity of the Varty Lake dike. The second phase of the project will be to investigate the area south and east of Picton and will be completed during the summer of 2005.

Four abandoned limestone quarries were inspected and located using a GPS instrument. Investigation of these sites revealed no occurrence of kimberlite. The following are the sites visited (all NAD 27):

- Garry Drew (Perm. Lafarge) – MDI31C07SW00026 – 18T, N4915255, E350899
- Camden E. Township – MDI31C07SW00020 – 18T, N4912714, E352542
- Doupe – MDI31C07SW00060 – 18T, N4911567, E353245
- Newburgh Quarry – MDI31C07SW00009 – 18T, N4908811, E350783

RECOMMENDATIONS FOR EXPLORATION

Molybdenum in Southeastern Ontario

A dramatic increase in the price and demand for molybdenum continued throughout 2003 and 2004. Southeastern Ontario has a history of molybdenum production dating from 1915. Most recent production was in the 1940s.

The southeastern Ontario deposits are divided into 3 classifications: stratabound-skarn hosted; unconformable to conformable pegmatite hosted; and stratiform paragneiss hosted.

In the Bancroft area, 5 deposits in production from 1917 to 1918 produced several thousand pounds of molybdenum from ore grading from 3.85% MoS_2 to 5.8% MoS_2.

There are 45 documented molybdenum occurrences in the Renfrew area, including 10 past producers. Reported grades varied from 18% MoS_2 to 0.18% MoS_2. At least 2 of these deposits have known resources. Additional prospects and occurrences have been documented in these areas and in the Madoc–Sharbot Lake area. Further examination of the molybdenum potential in southeastern Ontario is recommended for exploration.

Table 9. Past-producing molybdenum deposits of southeastern Ontario.*

Property	Production**
Chisholm	5 tons of crude concentrate shipped to the Mines Branch in 1917 assayed 5.8 % MoS_2.
Mooney	Several hundred pounds of ore sent to U.S. in 1917.
Gibson	1300 pounds of ore grading 3.85% molybdenite were shipped in 1916.
Padwell	55.5 tons grading 1.4% molybdenite were shipped to the Mines Branch, Ottawa, and 62 tons of 1.0% molybdenite to the International Molybdenum Co. at Renfrew in 1916.
Lillico	1797 pounds of molybdenite were recovered from 157.5 tons of ore in 1917-1918.
American Molybdenite	320 pounds of molybdenite were recovered with an average grade of 0.30% molybdenite.
McCoy	10 tons of ore shipped from 1916 to 1917.
Spain	5200 ton of ore of unknown grade indicated by diamond drilling.
Sunset	Approx. 20 tons of ore containing 5.47% to 0.65% molybdenite were shipped to Ottawa from which 936 pounds of pure molybdenite were recovered.
Jamieson	Shipment of 73.1 tons of 3% ore and 12.15 tons of 18% ore in 1915.
Leidtke	27 tons of hand-cobbed ore containing 0.75% molybdenite were shipped in 1942.
Zenith	80 tons of ore produced pre-1924. 1934-1937: 8579 tons hoisted with some 15 to 22 tons of concentrates consisting of 80-85% molybdenite were produced.
Gorman	21.72 tons of 0.38% ore were shipped to the Mines Branch in Ottawa in 1917. 117 pounds of pure molybdenite were recovered.
Rose	316 pounds of pure molybdenite were recovered from shipments obtained in 1917.
Ross-O'Brien	Diamond drilling indicated possible reserves of 2000 tons of ore grading 1% molybdenite.
Hunt Mine	Total production was 96 660 pounds of concentrates, 85% of which averaged about 95% molybdenite.

**The resource estimates listed above do not follow the required disclosure for reserves and resources as outlined in National Instrument 43-101, and are historic resource figures generated by past workers.*
***Production notes derived from Carter et al. (1980), Johnston (1968), Malczak et al. (1985), the US Geological Survey Minerals Yearbook (2003), and files of the Southeast Ontario Resident Geologist office.*

Gold in Southeastern Ontario, Madoc–Grimsthorpe Area

Gold was first discovered in Ontario in 1866 near the community of Eldorado north of Madoc. Between 1895 to 1908, gold production in the area peaked with 12 mines in production. In the 1930s Cominco Ltd. undertook extensive underground exploration at both the Cordova and Addington gold mines. By 1939 all gold production and exploration activity in the region had ceased. It was not until the late 1970s that exploration for gold recommenced in this area, mainly due to the commodity's increased price.

Exploration capital raised by "flow through financing" along with new discoveries fueled renewed gold exploration activity during the 1980s. In 1990, gold exploration activity diminished once again, only to be revived in 1996. In 2004, renewed interest in gold exploration occurred within the Southeast Ontario District. In the Madoc–Grimsthorpe area, there are a number of gold prospects including several with identified resources in a variety of geological settings. Positive results from previous exploration identified areas of high potential where further investigation is warranted.

R.M. Easton, Precambrian Geoscience Section, Ontario Geological Survey, spent approximately 6 weeks of the 2004 field season carrying out geological mapping and sampling of a portion of western Tudor and eastern Grimsthorpe townships. In the report of this project, Dr. Easton recommends the intersection of the Gilmour shear zone with the Moira River fault as a prime exploration target for gold. For further information please refer to Easton (2004).

Table 10. Gold deposits of the Madoc–Grimsthorpe area, southeastern Ontario.*

Deposit	Status
Madoc Township	
Bannockburn	Developed Prospect: Published resource - 225 000 tons grading 0.267 ounces per ton.
Richardson	1866-68: Produced 75 to 100 ounces from an average grade of 0.408 ounces per ton.
Sophia	1900: Produced 50 ounces; 1941– Produced 60 ounces from 300 tons milled.
Elzevir Township	
Cooper	Developed Prospect: published resource of 40 000 t @ 8.0 gpt Au and 3 Mt @ 30-33% recoverable talc.
Belmont Township	
Cordova	1892: Produced 22 774 ounces from 120 670 tons milled. Average grade 0.19.
Ledyard	1893-94: Produced 13 ounces from 55 tons milled. Average grade 0.24 ounces per ton.
Tudor Township	
Craig	1905-06: Produced 248 ounces from 1 850 tons milled. Average grade 0.13 ounces per ton.
Grimsthorpe Township	
Gilmour	1909-10: Produced 172 ounces from 550 tons milled. Average grade 0.31 ounces per ton.
Marmora Township	
Dingman	Developed Prospect: Published resource 7 Mt @ 1.8 gpt Au.
Cook	1901-04: Produced 289 ounces from 1 483 tons milled. Average grade 0.26 ounces per ton.
Sovereign	1878, 1892-1900: Produced 370 ounces from 1 962 tons milled. Average grade 0.19 ounces per ton.
Pearce	1893-08: Produced 302 ounces from 239 tons milled. Average grade 1.26 ounces per ton.
Gatling 5 Acre	1900-03: Produced 2 353 ounces from 6 114 tons milled. Average grade 0.38 ounces per ton.
Deloro	1897-02: Produced 10 360 ounces from 39 143 tons milled. Average grade 0.26 ounces per ton.

** The resource estimates listed above do not follow the required disclosure for reserves and resources as outlined in National Instrument 43-101, and are historic resource figures generated by past workers.*

Southern Ontario Stone

Southern Ontario is a major producer of stone and stone products including dolostone, gneiss, granite, limestone, sandstone, marble and trap rock, for use as dimension stone, landscape stone and crushed stone aggregate. Most crushed stone comes from Paleozoic limestone and dolostone. In 2003, the last year for which production figures are available, Ontario's stone production was valued at $506M. Most of this production came from southern Ontario.

The following recommendations focus on commodities with identified market potential as well as favourable geology. Exploration for new sources of the following types of stone is recommended:

- Dimension stone, particularly unusual granites and marbles. New opportunities result from the introduction of new processing techniques, in particular the use of resins to impregnate and stabilize stone. Targets: Grenville province, southeastern Ontario.
- Unique landscaping stone for domestic use and for export. Targets: Gull River limestone and landscape stone in the Orillia and Minden to Peterborough areas.
- High-quality crushed stone aggregate for the Greater Toronto Area, including carbonates, granite and traprock. Pressures on existing sources of aggregate for the Greater Toronto Area are of growing concern.

Table 11. Mineral deposits not currently being mined, 2004 – Southern Ontario Regional Resident Geologist (Southeast) District.* (Abbreviations: MDI = Mineral Deposit Inventory; MDC = Mineral Deposit Circular; I = Inactive; A = Active.)

Deposit/Township	MDI File Number	Status	Commodity	Reserves	Reserve Reference
Ore Chimney Prospect Barrie Township	MDI31C14SE-00142 (SO 1130)	I	Ag, Au, Zn, Pb	11 000 tons above the 500-foot level Averages: 0.2 oz/ton Au, 5.64 oz/ton Ag, 2.0% Zn, 1.0% Pb	MDC 12 p132 MDC 18 p33
Macassa Nickel Limerick Township	MDI31C13SE-00099 (SO 0595)	I	Ni ,Cu	2 000 000 tons @ 1.0% Ni, 0.25% Cu	MDC 12 p138
Renfrew Zinc (Renprior) Admaston Township	MDI31F07NE-00063 (SO 0286)	A	Zn	16 000 tons @ 10.5% Zn to a depth of 30 m Breakwater Resources optioned the property to Noranda Mining and Exploration in 1996	MDC 12 p226 MDC 20 p17
Harvey Simon Prospect Lyndoch Township	MDI31F03NW-00044 (SO 0259)	I	Cu, Fe, Zn	250 000 tons @ 1.1% Cu to 350 feet	MDC 12 p226 MDC 20 p45
Clyde Forks Deposit Lavant Township	MDI31F02SE-00064 (SO 0351)	I	Cu, Sb, Ag, Hg	60 000 tons @ 0.67% Cu, 0.37 0% Sb, 0.03% Hg, 1.32 oz/ton Ag	MDC 20 p36
Twin Lakes Diorite Methuen Township	MDI31C12NW-00114 (SO 3840)	I	Ti	13.2 Mt of 21.7% TiO_2, recoverable from open pit to a depth of 165 m, with rock : ore ratio = 0 : 54	CIM Bulletin, Vol. 83, No. 934, p99
Grattan Deposit Grattan Township	MDI31F06NE-00017 (SO 0270)	I	Fe	Proven: 3 639 600 tons to a vein depth of 363 feet Indicated: 9 099 000 tons to a vertical depth of 600 feet @ average grade of 27.74% Fe	MDC 20 p98
Radenhurst-Caldwell Deposit Lavant Township	MDI31F02NE-00012 (SO 0349)	I	Fe	Main lens 2000 feet long by 31.3 feet wide; contains 6500 tons per slope foot at a grade of 32.77% Fe; 3 additional zones totaling 1600 feet in length average 17%, 16.7% and 25.5% Fe, respectively	MDC 20 p104
Bessemer Deposit Mayo Township	MDI31F04SE-00012 (SO 0235)	I	Fe	No.4 deposit 2 480 819 tons @ 28.62% recoverable Fe	MDC 20 p110
Childs Deposit Mayo Township	MDI31F04SE-00013 (SO 0236)	I	Fe	6 193 330 tons @ 19.25% recoverable Fe	MDC 20 p114
Tomclid Magnetite South Canonto Township	MDI31F02SW-00032 (SO0282)	I	Fe	1993 published reserves estimated at 3 Mt averaging 40% Fe; reserve estimate has not been adjusted to reflect production from the deposit in late-1990s	MP 161 p377
Calabogie Magnetite Property / Algoma Ore Prop. Ltd. Bagot Township	MDI31F07SE-00009 (SO 0353)	I	Fe	Reserves of 45 million tons @ 25% Fe to 500 feet and 28% Fe to 1000 feet	MDC 11 p314
Buckhorn Deposit Bagot Township	MDI31F07NE-00069 (SO0362)	I	Mo	Largest of numerous small lenses contains 1500 tons @ 1% MoS_2	MDC 20 p132
Bannockburn (Madoc Mining Company Ltd.) Madoc Township	MDI31C12NE-00195 (SO 7274)	I	Au	225 000 tons grading 0.267 oz/ton Au	MP 161 p377
Cooper Spruce Ridge Resources Ltd. Elzevir Township	MDI31C11SW-00044 (SO 2679)	I	Au, Talc	3 Mt @ 30-33% recoverable talc and 40 000 t @ 8.0 gpt Au	OFR 5945 p92 OFR 5808 p79
Dingman Deposit Marmora Township	MDI31C12SE-00040 (SO 3590)	A	Au	7 Mt @ 1.8 gpt Au	OFR 5958 p11, 13
Hawley Ram Petroleum Limited Olden Township	MDI31C10NW-00117 (SO 4057)	A	Wollastonite	2.5 Mt @ 32% wollastonite to a vertical depth of 75 m	OFR 5943 p337
Marmora Gitennes Exploration Inc. Marmora Township	MDI31C12SE-00096 (SO 3729)	I	Wollastonite	450 000 t (open pit) @ 47% wollastonite, plus 680 000 t @ 39% wollastonite in a separate zone	OFR 5715 p50

Deposit/Township	MDI File Number	Status	Commodity	Reserves	Reserve Reference
Trudeau C. Roger Young Hungerford Township	MDI31C11SW-00049 (SO 1192)	A	Calcite, Dolomite	4 Mt high-purity dolomite; no reserve estimate available for the calcite zone	OFR 5958 p11-11
Verona-Kirkham Stewart Lake Resources Inc. Bedford Township	MDI31C10SE-00023 (SO 1244)	I	Graphite	1.6 Mt grading 9.5% graphite in 2 separate zones	MDC 33 p16
Cal Graphite Corp. Butt Township	MDI31E11NE-00004 (N0129)	I	Graphite	Reserves of 60 Mt grading 3% graphitic carbon	MDC 33 p10
Globe Graphite Mine North Elmsley Township	MDI31C16SE-00016 (SO 1604)	I	Graphite	500 000 t of approximately 7% graphite below mined out portion to the 300-foot level.	MDC 33 p25
Cordova Mine Belmont Township	MDI31C12SW-00005 (SO 1670)	I	Gold	115 982 tons @ 0.21 oz Au/ton	OFR 5808 p43

**Table does not include nepheline syenite, trap rock, REE and dimension stone deposits.*

Table 12. Titanium, tantalum, REE occurrences compiled from MDI–2 database – Southern Ontario Regional Resident Geologist (Southeast) District.

Name	Township	MDI File #	Commodity	Deposit Status
Harrington, Marsh Ore Bed	Marmora	MDI31C05NE00135	Au, Fe, Ti	Occurrence
Green Island Rutile	Huntingdon	MDI31C06NW00088	Ti	Occurrence
Matthews, Newboro Lake	North Crosby	MDI31C09NW00009	Fe, Ti	Past Producer with Reserves
Chaffey	South Crosby	MDI31C09NW00011	Fe, Ti	Past Producer with Reserves
Tommy Lake	North Crosby	MDI31C09NW00131	Ti	Occurrence
Ricketts	Lake	MDI31C12NE00109	Fe, Ti	Occurrence
Orton	Tudor	MDI31C12NE00122	Fe, Ti	Past Producer w/o Reserves
Hastings Road Magnetite	Tudor	MDI31C12NE00185	Fe, Ti	Occurrence
Harold White, Twin Lake	Methuen	MDI31C12NW00114	Fe, Ti	Occurrence
Horse Lake, Tripp	Methuen	MDI31C12NW00127	Fe, Ti	Occurrence
Maloney	Marmora	MDI31C12SW00002	Cr, Cu, Fe, Ni, Ti	Past Producer w/o Reserves
Canadian Nickel	Methuen	MDI31C12SW00121	Ti	Occurrence
Ridgway	Marmora	MDI31C12SW00122	Cu, Fe, Ti	Occurrence
Jocko Lake	Limerick	MDI31C13NE00107	Fe, Ti	Occurrence
Umfraville	Wollaston	MDI31C13NW00057	Co, Fe, Phosphate, Ti	Occurrence
Canning Lake	Minden	MDI31D15NE00052	Fe, Ti	Occurrence
Pine Lake	Glamorgan	MDI31D16NW00215	Fe, Ni, Ti, V	Occurrence
Basin, Silver Crater (Basin)	Faraday	MDI31E01SE00054	Mica, Mo, Nb, Th, U, Ti	Past Producer w/o Reserves
Allen Lake	Harcourt	MDI31E01SE00306	Fe, Ti	Occurrence
Gal-Wood	Sabine	MDI31E08NE00010	Gd, Nb, Ta, Ti, U	Occurrence
Woodcox	Monteagle	MDI31F04NW00020	Ce, Feldspar, Nb, U, Ta, Th, Ti, Zircon	Past Producer w/o Reserves
Macdonald Mine	Monteagle	MDI31F04NW00023	Cu, Feldspar, Mo, Nb, REE, Th, Ti, U, Zircon	Past Producer w/o Reserves
Opeongo	Sebastopol	MDI31F06NE00093	Ag, Ce, Nb, Ta, Th, Ti, U, Y, Zircon	Occurrence

Name	Township	MDI File #	Commodity	Deposit Status
East Rockingham	Brudenell	MDI31F06NW00085	Au, Ti	Occurrence
South Lamberts	Griffith	MDI31F06SE00161	Ti	Occurrence
Horton Twp, Ottawa River	Horton	MDI31F10SE00019	Fe, Ti	Occurrence
Mahoney and Morin	Sabine	MDI31E08SE00002	Feldspar, Nb, REE, Ta, U	Past Producer w/o Reserves
Genesee No. 2 South	Monteagle	MDI31F04NW00018	Feldspar, Nb, Si, Ta, Th, U	Past Producer with Reserves
Plunkett, Plunkett South	Monteagle	MDI31F04NW00019	Ce, Feldspar, Amethyst, Mo, Nb, Th, Ta, U	Past Producer w/o Reserves
Dubblestein	Bangor	MDI31F05SW00010	Nb, Ta, Th, U	Occurrence
Tooeys Lake, Tooley Lake	Brougham	MDI31F06SE00090	Nb, Ta, Th, U	Occurrence
Renfrew Minerals, Wal-Gem West Quarry	Lyndoch	MDI31F06SW00013	Be, Feldspar, Fluorite, Mo, Nb, REE, Si, Ta, Th, U, Zircon	Producing Mine
Barr Feldspar Quarry, Woermke	Fraser	MDI31F14SW00003	Ce, Feldspar, Nb, Ta, Th, U	Past Producer w/o Reserves
Quinn	Olden	MDI31C10NW00366	Cu, Ni, REE	Occurrence
Orser-Kraft	South Sherbrooke	MDI31C15SE00027	Feldspar, Nb, REE, Th, U	Past Producer w/o Reserves
Nobles Bay, Rogers, J.	North Burgess	MDI31C16SE00004	Mica, REE	Past Producer w/o Reserves
Maclaren, W L.	North Burgess	MDI31C16SW00017	Mica, Phosphate, REE	Past Producer w/o Reserves
Christie Lake	South Sherbrooke	MDI31C16SW00142	Magnetite, Nb, REE	Occurrence
Drude South	Cavendish	MDI31D09NW00079	REE, Th, U	Occurrence
Copper Anomaly	Lutterworth	MDI31D15SE00151	Cu, REE, Sr, Zircon	Occurrence
Rare Earth Anomaly	Lutterworth	MDI31D15SE00152	Cu, REE, Sr, Zircon	Occurrence
North Rare Earth Anomaly	Lutterworth	MDI31D15SE00153	Cu, REE, Sr, Zircon	Occurrence
Laurencin, Milhol	Cardiff	MDI31D16NE00160	Mo, REE, Th, U	Occurrence
Mclennan, J.G.	Peck	MDI31E07NE00006	Nb, REE	Occurrence
Malcovitch, P.	Clyde	MDI31E08NW00003	Ce, REE, U	Occurrence
Gole, J.G.	Murchison	MDI31E09SE00004	Feldspar, Nb, REE, Si, U, Zircon	Past Producer w/o Reserves
Cameron and Aleck	Murchison	MDI31E09SE00005	Feldspar, Nb, REE	Past Producer w/o Reserves
D'Eldona, Yankee Dam	Butt	MDI31E11NE00070	Nb, REE, U	Occurrence
Plunkett North	Monteagle	MDI31F04NW00185	Feldspar, REE, U	Occurrence
Lake Clear	Sebastopol	MDI31F06NE00092	REE, Th, U	Occurrence
Price, E.C., Quadeville	Lyndoch	MDI31F06SW00014	Be, Feldspar, Fluorite, Nb, Phosphate, REE, Si, Th, U, Zircon	Producing Mine
Universal Light Metals	Lyndoch	MDI31F06SW00065	Be, Ce, Nb, REE, Th, U	Occurrence
Lake Property, Lake Mine	Dickens	MDI31F12SW00006	Feldspar, REE	Past Producer w/o Reserves

Note: MDI-2 database was queried for Ti, Ta and REE occurrences. This listing indicates the presence of the commodities, not necessarily their order of abundance. This list should be used as a preliminary guide. Hard copies of these complete MDI files are located at the RGP office in Tweed.

Table 13. Historic production of gold – Southern Ontario Regional Resident Geologist (Southeast) District.

Mine	Township	Operating Years	Tons Milled	Ounces Produced	Grade (oz/ton)
Big Dipper	Barrie	1907-09	52	17	0.33
Cook	Marmora	1901-04	1483	289	0.26
Cordova	Belmont	1892	120 670	22 774	0.19
Craig	Tudor	1905-06	1850	248	0.13
Deloro	Marmora	1897-02	39 143	10 360	0.26
Gatling 5 Acre	Marmora	1900-03	6114	2353	0.38
Gilmour	Grimsthorpe	1909-10	550	172	0.31
Golden Fleece	Kaladar	1919-22	Unknown	480	Unknown
Ledyard	Belmont	1893-94	55	13	0.24
Pearce	Marmora	1893-08	239	302	1.26
Richardson	Madoc	1866-1868	Unknown	75 – 100 oz.	0.408
Sophia	Madoc	1900-41	1800	110	0.06
Sovereign	Marmora	1878 1892-1900	Unknown 1962	970 370	Unknown 0.19
Star of the East	Barrie	1905-07	976	134	0.14
		Total	174 894	38 592	

Table 14. Historic production of copper, lead and zinc – Southern Ontario Regional Resident Geologist (Southeast) District.

Mine	Twp.	Operating Years	Tons Milled	Production
Kingdon	Fitzroy	1884-85, 1914-31	905 000	76 821409 lbs Pb conc.; 857 312 lbs Zn conc.; 60 074 072 lbs Pb rec
Long Lake	Olden	1897-25, 1973-74	3442 , NA	$41 550 ore value, 9467 tons Zn valued at $1 227 000
Eldorado Copper	Madoc	1906	NA	234 000 lbs Cu matte containing 230 oz Au, 182 oz Ag, 109 000 lbs Cu
Hollandia Lead	Madoc	1903-06	NA	2 653 365 lbs Pb

Table 15. Historic production of iron – Southern Ontario Regional Resident Geologist (Southeast) District.

Mine	Township	Operating Years	Tons Milled	Grade (% Fe)
Calabogie	Bagot	1883-1901	10 000	26
Martel	Bagot	Pre 1890	2000	58.71
Williams (Black Bay)	Bagot	1880-90	25 000	51.89
Black Lake	Bedford	1882-1884	4000	40
Glendower	Bedford	1873-1895	50 000	50-60
Belmont (Ledyard)	Belmont	1899-1900, 1911-1913	8433	51.2
Blairton	Belmont	1820-1875	300 000	51.8
Playfair (Dalhousie)	Dalhousie	1866-71	11 100	57.6
Radnor	Grattan	1901-1907	18 824	47.5
Eagle Lake (Blessington)	Hinchinbrooke	1887-1891	700	65.55
Tomahawk (Mag-Iron)	Lake	1947, 1950-57	2096	50.9
Wilbur	Lavant	Pre 1900, 1907-8	146 892	56.69
Magnetawan	Lount	1910-1912	6000	59.55
Paxton	Lutterworth	Before 1910	1000	NA
Miller	Madoc	1899	6823	NA
Wallbridge	Madoc	1900-01, 1919, 1921	3421	NA
Marmoraton	Marmora	1952-1978	28 000 000	40
Bessemer	Mayo	1902-13	99 613	42.18
Childs	Mayo	1913	9649	38.7
McNab	McNab	1873-74	15 000	68
Robertsville & Mary	Palmerston	1895, 1900-1, 1918-9	13 477	70.5
Fournier	S. Sherbrooke	1873	600	60
Howland	Snowdon	1880-2	1500	58
Victoria	Snowdon	1882	?	58.35
Dog Lake	Storrington	1899	600	51.12
St. Charles	Tudor	1900-02	5186	57-60
Coe Hill	Wollaston	1884-1914	100 000	51.4
Total			**28 841 914**	

Table 16. Historic production of fluorite – Southern Ontario Regional Resident Geologist (Southeast) District.

Mine	MDI Number	Township	Operating Years	Total Production (Tons)
Bailey	31C06NW00003	Madoc	1907, 1916, 1917, 1944-50	25 000
Blakely	31C06NW00019	Huntingdon	1918-20, 1928, 1941-47	5026
Coe	31C06NW00008	Huntingdon	1941-42	114
Dwyer	31E01SE00091	Cardiff	1918-20, 1943, 1944	97
Herrington South	31C05NE00009	Huntingdon	1917	13
Howard, Fred Hill	31C06NW00014	Huntingdon	1918, 1920, 1929, 1940-42, 1944	2500
Johnston	31C06NW00013	Huntingdon	1943, 1944-47, 1949	187
Keene	31C06NW00004	Huntingdon	1918-19, 1943, 1944, 1950	5000
Kilpatrick	31C06NW00005	Huntingdon	1944, 1953-1959	11 566
Lee Junior	31C05NE00008	Madoc	1917, 1940, 1943-45	2000
Lee Senior	31C05NE00006	Madoc	1916-1918, 1942, 1943	1600
McIlroy	31C05NE00003	Madoc	1917-18, 1923, 1944	540
Miller	31C05NE00005	Madoc	1917-1919	460
Noyes	31C06NW00011	Huntingdon	1917-20, 1941-43	25 000
Palmateer	31C06NW00016	Huntingdon	1942	44
Perry	31C06NW00009	Huntingdon	1915-20, 1941-43	8000
Perry Lake	31C06NW00007	Huntingdon	1910, 1913, 1915, 1917, 1952, 1960	4000
Ponton	31C05NE00004	Madoc	1929-1942	1500
Rogers	31C06NW00018	Huntingdon	1909-1914, 1943-51	45 000
Rooks	31C12SE00003	Madoc	1916-18	100
South Reynolds	31C06NW00010	Huntingdon	1917-18, 1943	100
Wallbridge & Herrington	31C05NE00007	Madoc	1920-1922, 1941-1943	6600
William Reynolds	31C12SE00002	Madoc	1941-42	88

Fluorspar, a commercial fluorite product, is used as a flux in the making of steel and ceramics, as a constituent in the electrolytic process of making aluminum and in the production of hydrofluoric acid (HF). During World War II, a Canadian Government assistance program, in the form of loans and drill hole explorations stimulated development of the Madoc deposits (Guillet,1964, p.1).

OGS ACTIVITIES

R.M. Easton, Precambrian Geoscience Section, Ontario Geological Survey, spent approximately 6 weeks of the 2004 field season carrying out geological mapping and sampling of a portion of western Tudor and eastern Grimsthorpe townships. Although the area has been actively explored since 1989, the geological base and knowledge on the controls on gold mineralization in the area is limited. A new 1:50 000 scale map will be produced as part of the project. For a detailed description of the project please refer to Easton (2004).

J.L. Reid, Sedimentary Geoscience Section, Ontario Geological Survey, completed a regional overburden indicator mineral and water sampling survey in the 2004 field season to evaluate the diamond and other mineral potential in

the Tweed area in southeastern Ontario. Results of the survey are expected to be released in 2005. For a detailed description of the project please see Reid (2004).

D.F. Russell, Sedimentary Geoscience Section, Ontario Geological Survey, completed research in 3 areas in southeastern Ontario as part of an ongoing provincial initiative to protect the quality of soil and water in Ontario. The study areas were centred on Prince Edward County, Smith Falls and Gananoque. For a detailed description of the project please refer to Russell (2004).

For a complete list of OGS publications received by the Tweed RGPO library, please see Table 8.

RESEARCH BY OTHER AGENCIES

Mallorytown Glassworks

The first glassworks in Canada operated c. 1839-40 in the community of Mallorytown near Brockville. Although the site of the glassworks itself has been located and excavated, the source of the silica used in the glassmaking process has not yet been identified. The Potsdam Formation sandstone has been suggested as a potential locally available raw material. Dr. V. Owen, St. Mary's University, New Brunswick, is investigating potential sources of silica for the glassworks through chemical analysis of waste glass from the site of the factory, which has a distinctive composition. In October 2004, Dr. Owen was given a tour of 7 selected sandstone occurrences within easy driving distance of Mallorytown. Results from Dr. Owen's research will be provided to the RGO and added to the sandstone database.

REFERENCES

Barnett, R.L., Arima, M., Blackwell, J.D., Winder, C.G., Palmer, H.C. and Hayatsu, A. 1984. The Picton and Varty Lake ultramafic dikes: Jurassic magmatism in the St. Lawrence Platform near Belleville, Ontario; Canadian Journal of Earth Sciences, v.21, p.1460-1472.

Carlson, H.D. 1953. Geology of the Brudenell–Raglan area; Ontario Department of Mines, Annual Report for 1953, Appendix A, Craigmont Corundum Deposits, v.62, pt.5, 123p.

Carter, T.R., Colvine, A.C. and Meyn, H.D.1980. Geology of base metal, precious metal, iron and molybdenum deposits in the Pembroke–Renfrew area; Ontario Geological Survey, Mineral Deposits Circular 20, 186p.

Debicki, R.L., Drost, A.P., Fraser, R.J., Rowell, D.J. and Yule, G.R. 2004. Report of Activities, 2003, Resident Geologist Program, Regional Land Use Geologist Report: Northwestern, Northeastern and Southern Ontario Regions; Ontario Geological Survey, Open File Report 6133, 35p.

Dillon, E.P. 1985. Gold-quartz–arsenopyrite deposits localized near the base of the Flinton Group, Kaladar and Barrie townships, southeastern Ontario; Ontario Geological Survey, Open File Report 5529, 69p.

Easton, R.M. 1992. Metallogeny of the Grenville Province; *in* Geology of Ontario, Ontario Geological Survey, Special Volume 4, Part 2, p.1217-1252.

Easton, R.M. 2004. Geology, tectonic history and controls on gold mineralization in the western Grimsthorpe Domain, Central Metasedimentary Belt, Grenville Province; *in* Summary of Field Work and Other Activities 2004, Ontario Geological Survey, Open File Report 6145, p.14-1 to 14-21.

Guillet, G.R. 1964. Fluorspar in Ontario; Ontario Department of Mines, Industrial Mineral Report No. 12, 68p.

Gordon, J.B., Lovell, H.L., de Grijs, J.W. and Davie, R.F. 1979. Gold deposits of Ontario, part 2, part of District of Cochrane, districts of Muskoka, Nipissing, Parry Sound, Sudbury, Timiskaming, and counties in southern Ontario; Ontario Department of Mines, Mineral Deposits Circular 18, 253p.

Harburn, P. 1996. Industrial minerals, a global geology; Industrial Minerals Information Ltd., Surrey, UK, 462pp.

Harburn, P. 2002. Industrial minerals handbook, a guide to markets, specifications and prices; Industrial Minerals Information Ltd., Surrey, UK, 412p.

Hewitt, D.F. 1964. Building stones of Ontario, Part IV, Sandstone; Industrial Mineral Report 17, 57p.

Hewitt, D.F. 1967. Pegmatite mineral resources of Ontario; Industrial Mineral Report 21, 83p.

Hewitt, D.F. 1954. Geology of the Brudenell-Raglan Area; Ontario Department of Mines, Annual Report for 1953, v.62, pt.5, 123p.

Johnston, F.J. 1968. Molybdenum deposits of Ontario; Ontario Department of Mines, Mineral Deposits Circular No. 7, 98p.

Malczak, J., Carter, T.R. and Springer, J.S. 1985. Base metal, molybdenum, and precious metal deposits of the Madoc–Sharbot Lake area, southeastern Ontario; Ontario Geological Survey, Open File Report 5548, 394p.

Moyd, L. 1949. Structure of the corundum deposit at Craigmont, Renfrew County, Ontario; Geological Association of Canada, Proceedings, v.2, p.51-56.

Reid, J.L. 2004. Regional overburden and water sampling survey of the Tweed area, southeastern Ontario; *in* Summary of Field Work and Other Activities 2004, Ontario Geological Survey, Open File Report 6145, p.22-1 to 22-9.

Russell, D.F. 2004. Nutrient management project: characterization of fractured Paleozoic bedrock in thin drift areas of southern Ontario; *in* Summary of Field Work and Other Activities 2004, Ontario Geological Survey, Open File Report 6145, p.34-1 to 34-7.

Sangster, P.J., Farrow, D., Papertzian, V.C., Lee, C., Barua, M., Laidlaw, D.A., Hemmings, D. and Carter, T.R. 2004. Report of Activities, 2003, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre and Petroleum Resources Centre; Ontario Geological Survey, Open File Report 6132, 83p.

Storey, C.C. and Vos, M.A. 1981. Industrial minerals of the Pembroke–Renfrew area, Part 2; Ontario Geological Survey, Mineral Deposits Circular 22, 241p.

USGS, 2003, 2004. Mineral Commodity Summaries.

Southeast Ontario Mineral Deposit Inventory Files.

Assessment Files, Tweed Resident Geologist program Office.

Resident Geologist Program Files, Tweed.

Natural Resources Canada website.

Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Southern Ontario Regional Resident Geologist (Southwest Ontario District and Mines and Minerals Information Centre)–2004

by

K.G. Steele, C.R. Lee and M. Barua

2005

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Southwest Ontario District and Mines and Minerals Information Centre–2004

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Southern Ontario Regional Resident Geologist (Southwest Ontario District) and Mines and Minerals Information Centre–2004

K.G. Steele[1], C.R. Lee[2] and M. Barua[3]

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INTRODUCTION

The Mines and Minerals Information Centre (MMIC) and the Southwest Ontario District Geologist's office are located at 900 Bay Street in room M2-17, Macdonald Block, Queen's Park, Toronto. The MMIC is an information, research and sales office for the Mines and Minerals Division (MMD) of the Ministry of Northern Development and Mines (MNDM).

The Southwest Ontario District Geologist's office, a unit of the Resident Geologist Program, provides geological expertise and assistance to the mining, consulting, academic, land use planning and exploration communities, and various earth science-related services to the general public.

The Centre offers geological information and research materials, advisory services and expertise on Ontario's geology, mineral industries, and provincial regulations. MMIC staff also provides assistance and referral for clients who seek information concerning Ontario's Mining Act, and pertinent information administered and maintained by other ministries such as soils (Ontario Ministry of Agriculture, Food, and Rural Affairs—OMAFRA), oil and gas, pits and quarries, and aggregates (Ministry of Natural Resources—MNR).

Four mines, 41 quarries and 2 brine fields extracted industrial minerals, non-aggregate stone and dimension stone within the Southwest Ontario District in 2004 (Figure 1). These operations, including on-site processing facilities, employed approximately 3000 people in southwestern Ontario.

All Ontario production of salt, gypsum/wallboard, natural gas and petroleum, and most of the province's production of shale/brick, lime/dolime, sand and gravel, cement and stone comes from the Southwest Ontario District. Market demand for all mineral commodities produced within the District was very strong during 2004. The markets for salt, lime/dolime and dimension/landscape stone were noticeably larger than in 2003. Table 1 lists selected industrial mineral and fuel production in Ontario for 2001 to 2003, the most recent years for which production information is available.

Exploration, advanced exploration and development in the Southwest Ontario District maintained a healthy level of activity in 2004. The search for undiscovered deposits of dimension/landscape stone, high-purity limestone and dolostone, aggregate, shale/brick, zinc and other commodities should result in new quarries and/or mines coming into production in the future.

MINING ACTIVITY

In 2003 (the last year for which statistics are available; Table 1), the mining and quarrying of industrial minerals in the Southwest Ontario District generated approximately $1.75 billion of production value or approximately 30% of

Ontario's overall revenues from mineral production. This makes Southwest Ontario one of the leading mineral extraction areas of the province.

All of the province's salt, gypsum, natural gas and petroleum production, almost all of the clay/shale products and lime production, as well as a large percentage of the cement, sand and gravel, and stone production come from the Southwest Ontario District. The locations of all active mineral extraction operations in southwest Ontario are shown on Figure 1 (operations that extract construction aggregate, natural gas or petroleum are not included). The mines, quarries and brine well fields listed extract a variety of commodities for numerous end products, including salt (road salt, chemicals, food), gypsum (wallboard), limestone (lime, cement, glass, steel, building stone), shale (cement, bricks), dolostone (chemicals, glass, steel, building stone), sandstone (building stone) and gneiss (building stone, speciality aggregate).

Reported production figures for the 2 underground salt mines and 2 underground gypsum mines operating in the Southwest Ontario District in 2004 are presented in Table 2.

All of the province's oil and gas production occurs in the Southwest Ontario District. For information on oil and gas exploration and development activity in Ontario in 2004, please refer to the report of the Petroleum Resources Centre, this volume.

PRODUCERS AND RECENT DEVELOPMENTS

Salt

In 2004, two companies extracted salt in Ontario. Sifto Canada Inc., in Goderich, and The Canadian Salt Company Limited, in Windsor, continued to operate both rock salt mines and brine well fields.

Compass Minerals Group Inc., the parent company of Sifto Canada Inc., is one of the largest producers of rock, or highway de-icing, salt in North America and the United Kingdom, and operates the largest highway de-icing salt mines in these regions. The Goderich Mine is the largest rock salt mine in the world. The company sells highway salt primarily to state, provincial, county and municipal highway departments for de-icing applications. While subject to weather-related variations in demand, highway de-icing salt is not materially affected by economic downturns, as it is an essential part of highway maintenance to ensure public safety and continued personal and commercial mobility. The company is also the third largest producer of general trade salt in North America and the second largest in the United Kingdom, serving major retailers, agricultural cooperatives and food producers (Compass Minerals prospectus, November 2004).

Rohm and Haas Co., the parent company of The Canadian Salt Company Limited, is the largest producer of salt in North America.

Ontario rock salt production in 2004 achieved 8.95 Mt; this was over a million tonnes greater than 2003 production totals (Table 2). In 2004, the Goderich Mine achieved a record production level and the Ojibway Mine was just below its record production of 2003 (J. Vincent, The Canadian Salt Company Ltd. and K. Cassidy, Sifto Canada Inc., personal communication, January 2005). Winter weather conditions of 2004-2005 may push rock salt production up again in 2005.

In the past year, demand for general trade salt remained robust and production from brine at Goderich and Windsor continued at strong levels. The Canadian Salt Co. – Windsor fine salt facility (brine field and evaporation plant) produced at a record level in 2004, manufacturing 232 000 t of salt (M. Soave, personal communication, January 2005). In 2004, the Sifto Canada – Goderich evaporator plant production was at similar levels to 2003, with 126 000 t of fine salt produced (F. D'Entremont, personal communication, January 2005).

The salt extraction and processing industry employed approximately 775 workers in southwestern Ontario in 2004.

In 2005, it is estimated that the industry will invest approximately $3 million in upgraded equipment and facilities, in addition to regular production and maintenance capital costs.

COMPANY AND INDUSTRY NEWS

Compass Minerals' 2004 first quarter highway de-icing salt sales increased 6.9% to 4.7 million tons. General trade salt sales were 7.2% higher at 785 000 tonnes (Blendon Information Services, May 2004). The companys' salt sales in the 2004 third quarter were US$94.4 million. Highway de-icing shipments increased 14%, to 1.2 million tons, due to growth in rock salt sales to chemical producers, and general trade sales were slightly higher at 692 000 tons. Average highway de-icing prices were 4.3% higher, at US$26.39/ton, and general trade salt prices were 5.3% higher at US$89.97/ton (Blendon Information Services, November 2004).

Rohm and Haas Co. reported flat 2004 first quarter salt sales of US$284 million, as lower volumes in ice-control offset growth in non-ice-control products, favourable exchange rates, and higher prices. The segment's earnings were down 17%, at US$24 million, as promotional costs related to introduction of new products, as well as higher operating costs, notably natural gas prices, offset the favourable impact of pricing and exchange rates (Blendon Information Services, May 2004). The company reported 2004 third quarter salt sales of US$152 million, an increase of approximately 3% over the same period of 2003. The increase is attributed to higher demand in certain non-ice-control markets, higher pricing, and favourable currency exchange. The company's earnings from its salt business, however, were unchanged at US$3 million as higher energy costs offset the volume and price increases (Blendon Information Services, November 2004).

In early 2004, Environment Canada issued a *Code of Practice for the Environmental Management of Road Salts*. The code applies to any organization that uses more than 500 tonnes of road salts per year. These organizations have to prepare and implement a salt management plan that contains best management practices to protect the environment from the negative impacts of road salts. Environment Canada will review the effectiveness of the *Code* after 5 years and decide whether further steps are needed to protect the environment. The salt industry hopes that the *Code* is effective and that Environment Canada does not act on a recommendation that road salts be added to the country's list of toxic substances (Blendon Information Services, May 2004). New salt management plans may lead customers in Canada to require less road salt. Given the importance of road salt for traffic safety and the current lack of any practical substitute, it is unlikely that any guidelines or regulations will result in a complete ban on the use of road salt (Compass Minerals prospectus, November 2004).

Gypsum

In 2004, gypsum was mined at Caledonia by Georgia-Pacific Canada Inc. and at Hagersville by CGC Inc. Both operations have on-site wallboard manufacturing facilities. BPB Canada Inc. operates a wallboard facility in Mississauga, using flue gas desulphurization (FGD) gypsum supplied by Ontario Power Generation. All gypsum mines and wallboard manufacturing operations are located within the Southwest Ontario District (Figure 1).

In Canada, particularly in southern Ontario, the demand for wallboard remains strong in the residential and renovation sectors. All Ontario wallboard plants operated at or near capacity in 2004.

Total gypsum extraction in 2004 was approximately 765 000 tonnes. This production level was impacted by the decision of Georgia-Pacific Canada Inc. to permanently close the Caledonia No.3 Mine. The last gypsum was mined on May 6, 2004. The grade of gypsum mined, at approximately 72%, was too low to be used in the production of wallboard and other gypsum products. The company continues to operate the on-site wallboard manufacturing plant using 90% grade gypsum imported from Nova Scotia. The mine closure and decommissioning will be done with no planned lay-offs.

At CGC Inc., Ontario's largest miner of gypsum and manufacturer of drywall, 2004 operations continued at the same strong pace. The amount of gypsum extracted from the Hagersville Mine has remained at approximately the 700 000 tonnes per year level since 1997. Mined natural gypsum is mixed with FGD gypsum as inputs to the on-site wallboard plant.

Ontario gypsum mines and on-site wallboard manufacturing plants employed approximately 430 personnel in 2004.

Index to Figure 1. Producing mines and quarries—Southwest Ontario District, 2004.

△ **Producing Mines – Salt and Gypsum**

1. Sifto Canada Inc., Goderich Mine, Goderich — rock salt
2. The Canadian Salt Company Ltd., Ojibway Mine, Windsor — rock salt
3. Georgia Pacific Canada Inc., Caledonia No. 3 Mine, Caledonia (mine closed May 2004) — gypsum
4. CGC Inc., Hagersville Mine, Hagersville — gypsum

◇ **Producing Quarries – Cement**

5. Lafarge Canada Inc., Woodstock Quarry, Zorra Tp. — limestone
6. St. Marys Cement Inc., St. Marys Quarry, Blanshard Tp. — limestone
7. St. Marys Cement Inc., Bowmanville Quarry, Darlington Tp. — limestone
8. St. Lawrence Cement Inc. Mississauga Quarry, Mississauga — shale

⬠ **Producing Quarries – Brick Products**

9. Brampton Brick Ltd., Cheltenham Quarry, Chinguacousy Tp. — shale
10. Century Brick, Georgetown Quarry, Esquesing Tp. — shale
11. Hanson Brick Ltd., Milton Quarry, Esquesing Tp. — shale
12. Hanson Brick Ltd., Burlington Quarry, Burlington — shale
13. Hanson Brick Ltd., Aldershot Quarry, Burlington — shale
14. JADE Hardwoods Inc., Thedford Quarry, Bosanquet Tp. — shale

□ **Producing Quarries – Chemical, Metallurgical, and Filler Stone Products**

15. E.C. King Contracting Ltd., Sydenham Quarry, Sydenham Tp. — dolostone
16. Lafarge Canada Inc., Dundas Quarry, West Flamborough Tp. — dolostone
17. Carmeuse Lime Canada, Beachville Quarry, Zorra Tp. — limestone

○ **Producing Quarries – Dimension, Building, Landscape Stone and Specialty Aggregate Products**

18. A & A Natural Stone Ltd., A & A Quarry, Keppel Tp. — dolostone
19. Amsen Quarries Ltd., Mar Quarry, Albemarle Tp. — dolostone
20. Amsen Quarries Ltd., Wiarton Quarry, Amabel Tp. — dolostone
21. Arriscraft International Inc., Adair Marble Quarries, Albemarle Tp. — dolostone
22. Bruce Peninsula Stone Ltd., Lindsay Quarry, Lindsay Tp. — dolostone
23. Bruce Peninsula Stone Ltd., Wiarton Quarry, Amabel Tp. — dolostone
24. Cut Above Natural Stone, Cut Above Natural Stone Quarry, Rama Tp. — limestone
25. Deforest Brothers Quarry Ltd., Deforest Brothers Quarry, Caledon Tp. — sandstone
26. Dufferin Aggregates, Flamborough Quarry, West Flamborough Tp. — dolostone
27. Ebel Quarries Inc., Ebel Quarry, Amabel Tp. — dolostone
28. Ebel Quarries Inc., Arnold Property Quarry, Amabel Tp. — dolostone
29. Eisen Quarries Inc., Wiarton Quarry, Amabel Tp. — dolostone
30. Georgian Bay Marble and Stone, Cook Quarry, Amabel Tp. — dolostone
31. Hilltop Stone and Supply Inc., Hilltop Quarry, Esquesing Tp. — sandstone
32. International Fixture Installations Inc., Amabel Tp. — dolostone
33. James Lamb, Rama Tp. — dolostone
34. Limberlost Stone Inc., Limberlost Quarry, Albemarle Tp. — dolostone
35. MAQ Aggregates, Hewitt Property Quarry, Orillia Tp. — limestone
36. Owen Sound Ledgerock Ltd., Senesun Quarry, Amabel Tp. — dolostone
37. Owen Sound Ledgerock Ltd., Wiarton Quarry, Amabel Tp. — dolostone
38. Owen Sound Ledgerock Ltd., Owen Sound Quarry, Keppel Tp. — dolostone
39. Owen Sound Ledgerock Ltd., Hope Bay Quarry, Albemarle Tp. — dolostone
40. Rama Stone Quarries Ltd., Fleming Quarry, Rama Tp. — gneiss
41. Rice and McHarg Ltd., Rice and McHarg Quarry, Esquesing Tp. — sandstone
42. Rockleith Quarry Ltd., Rockleith Quarry, Orillia Tp. — limestone
43. Speiran Quarries Ltd., Speiran Quarry, Rama Tp. — limestone
44. Stone Cottage Inn Ltd., Attia/Rama Quarry, Rama Tp. — dolostone
45. Wiarton Stone Quarry Inc., Wiarton Stone Quarry, Amabel Tp. — dolostone

Producing Brine Well Fields – Salt

46. Sifto Canada Inc., Goderich Brine Field, Goderich — salt in brine
47. The Canadian Salt Company Ltd., Windsor Brine Field, Windsor — salt in brine

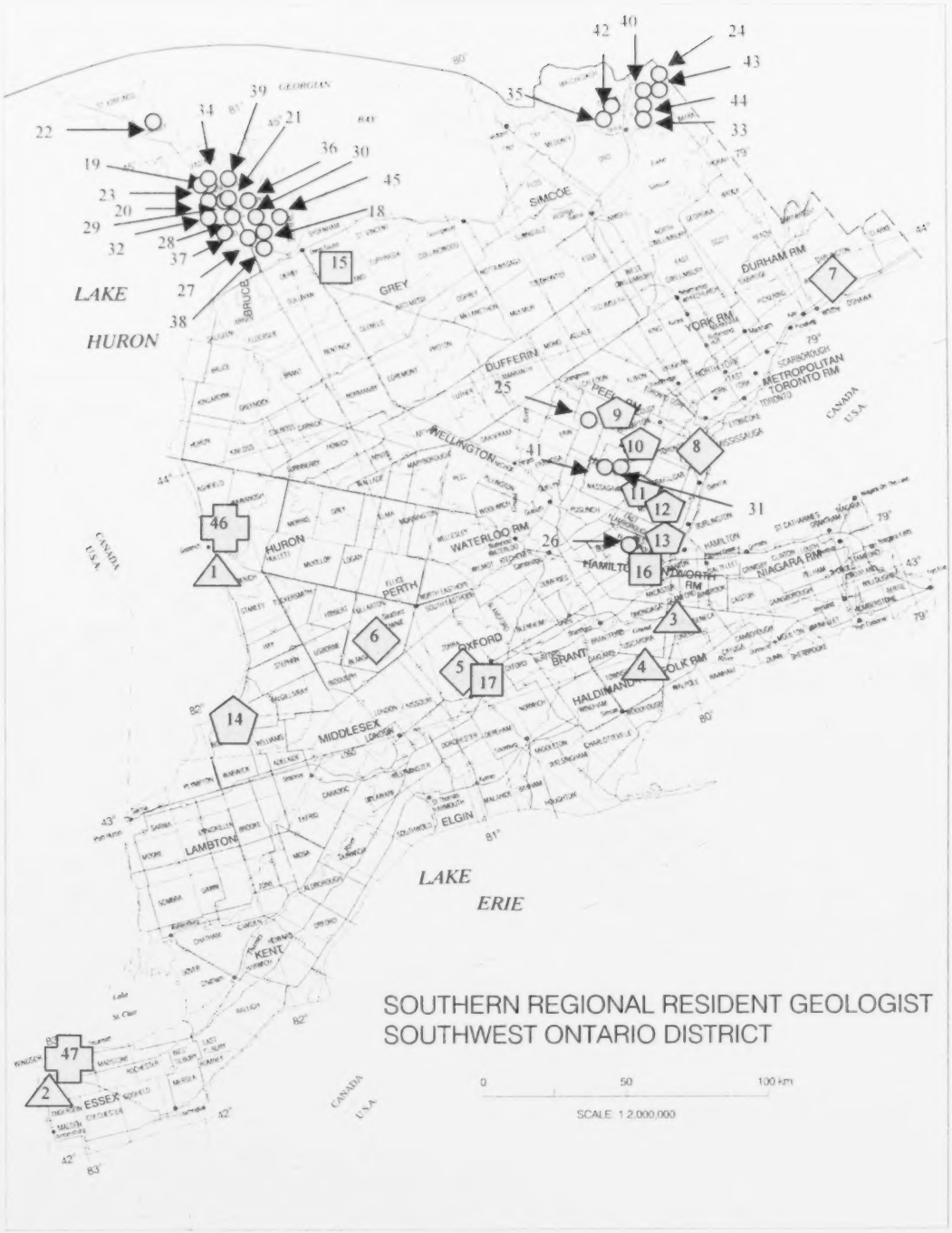

Figure 1. Producing mines and quarries–Southwest Ontario District, 2004.

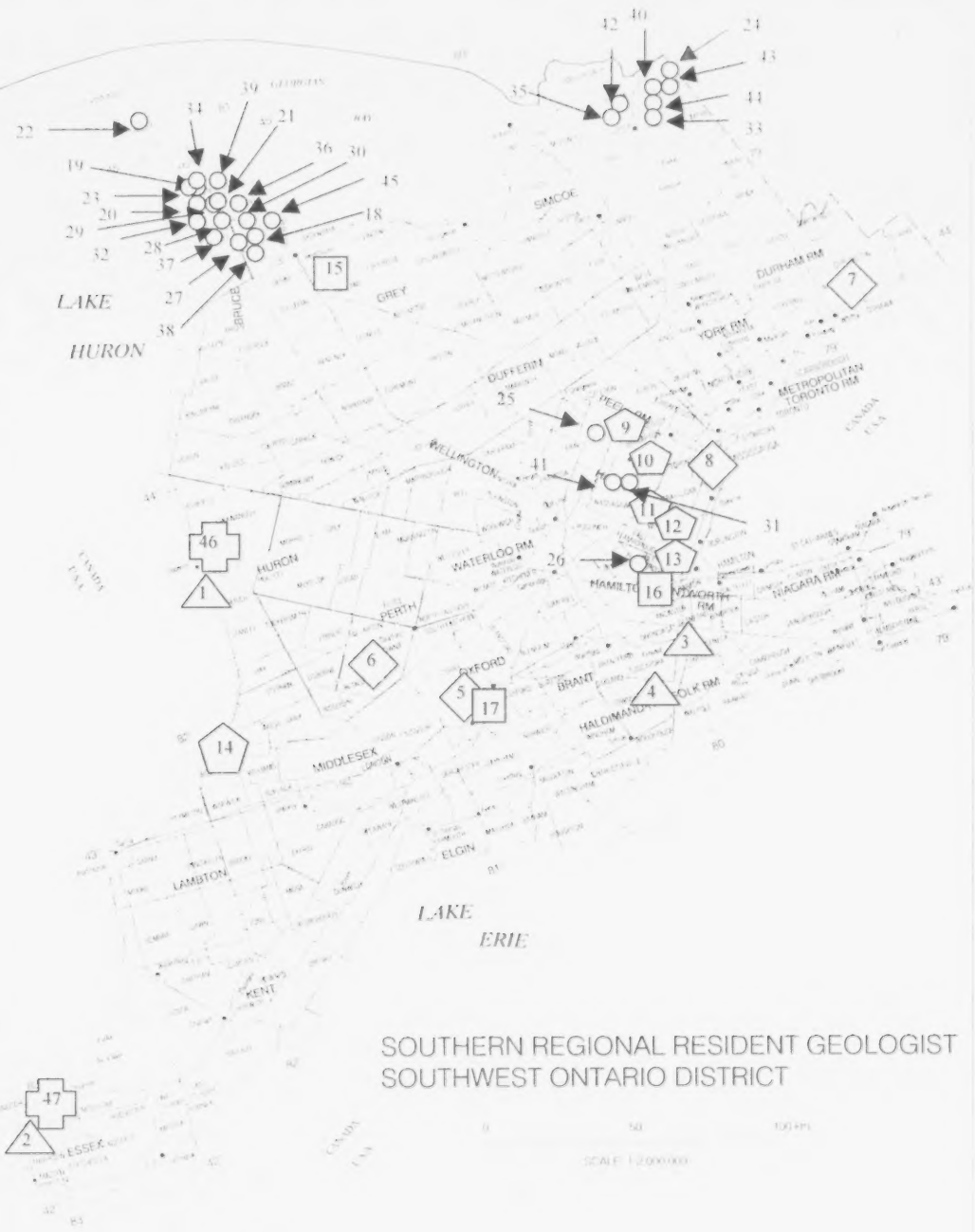

Figure 1. Producing mines and quarries, Southwest Ontario District, 2004.

COMPANY AND INDUSTRY NEWS

CGC Inc. of Mississauga, Ontario, a wholly-owned USG Corp of Chicago, subsidiary, reported for the first 9 months of 2004 an operating profit of US$34 million on net sales of US$214 million, up from US$23 million on sales of US$188 million in the prior-year period. The company benefited from higher wallboard selling prices and record shipments of Sheetrock wallboard and complementary products. Some of the increase is attributed to the strengthening of the Canadian dollar (Blendon Information Services, November 2004).

BPB plc of England reported that it more than doubled North American operating profit in the 6 months ended September 30, 2004. Higher selling prices and good regional sales volume growth more than offset significantly higher costs. The company's average realized wallboard price increased to US$114/million square feet from US$90/million square feet in the same period of 2003 (Blendon Information Services, November 2004).

Previously, BPB plc reported an underlying profit for its North American operations of 40.1 million pounds sterling (US$73.8 million) in the year ended March 31, 2004, a 36% increase over the previous year. Revenues for the year rose almost 7% to 488.8 million pounds sterling (US$899.4 million). BPB attributes the improvement to strong demand from the new housing and renovation sectors, better average selling prices in the second half in the United States, and significantly lower restructuring costs. The company's regional gypsum wallboard volumes grew 11%, driven by strong demand in the United States and Canada (Blendon Information Services, June 2004).

In February 2004, the Gypsum Association that represents industry companies located throughout the United States and Canada reported 2003 production. The United States gypsum board industry achieved its highest rate of annual shipments ever in calendar year 2003 when the manufacturers of gypsum board shipped a total of 31.72 billion square feet of material. This volume represents a substantial increase in shipments over the same 12-month period of 2002 when 29.87 billion square feet of board were shipped. Gypsum board shipments previously peaked in 1999 at 29.08 billion square feet, declined slightly in 2000, and then rebounded over the past 3 years.

Canadian manufacturers also experienced an increase in shipments as production increased from 3.28 billion square feet in 2002 to 3.42 billion square feet in 2003. Similar to the United States, Canadian shipments crested in 1999, declined in 2000 and have risen steadily since (Gypsum Association news release, February 2004).

Cement

Five cement plants, 3 limestone quarries and 1 shale quarry are located in southwestern Ontario. St. Marys Cement (Canada) Inc. operates limestone quarry and cement plant complexes at Bowmanville and St. Marys. Lafarge Canada Inc. operates a limestone quarry and cement plant near Woodstock. St. Lawrence Cement Inc. operates a cement plant and adjacent shale quarry in Mississauga. No shale was extracted from the Mississauga Quarry in 2004. Limestone is shipped to this cement plant from the company's Ogden Point quarry in southeastern Ontario. Federal White Cement Ltd. operates a specialized product cement plant near Woodstock using limestone purchased from a local quarry.

The 5 cement plants have a total cement (clinker) production capacity of almost 6 Mt. Primary-stage clinker production is more indicative of ultimate cement production capacity because this is the most capital and energy-intensive stage and clinker can be stockpiled for later use or sale (Natural Resources Canada, Canadian Minerals Yearbook, 2003).

Cement production levels remained high in 2004 in response to continuing strong demand in the southern Ontario and United States Great Lakes markets. Total cement production from Southwest Ontario District plants is estimated at over 4.6 Mt in 2004. In the District, cement quarries and plants employed approximately 630 people in 2004 (personal communication with most companies, 2004-2005).

COMPANY AND INDUSTRY NEWS

Votorantim Cimentos, part of one of the largest private industrial conglomerates in Brazil, continues to operate its Ontario plants under the St. Marys Cement Inc. name. The company purchased these assets in 2001, as its first mineral industry venture in North America.

At Bowmanville, as noted in a later section (see "Advanced Exploration and Development", "Cement Stone"), St. Marys Cement has proposed a significant project to deepen the quarry and provide approximately 30 years of additional resource. The company operates 9 cement distribution terminals in the Great Lakes region (U.S. and Canada) that are supplied with cement produced at the Bowmanville plant by ships belonging to St. Marys. Currently, approximately 3.5 million tonnes is extracted annually from the quarry, with about 85% of this total utilized by the cement plant (*Aggregates & Roadbuilding*, July/August 2004; T. Rinaldi, personal communication, January 2005).

At St. Marys, the company made significant capital and processing upgrades in 2004. A new finishing mill was installed and the kiln was adapted so it can be fed by either coal or pet coke. The total costs for these improvements are estimated at over $30 million (N. Fenty, personal communication, January 2005).

Swiss-based Holcim AG owns St. Lawrence Cement Inc. The company, which dominantly operates in the cement and aggregates/construction segments, reported for the first 9 months of 2004 sales of $897 million, an increase of 8% from the prior year. The improved performance resulted from, amongst over factors, lower cement plant production costs and firm and increased pricing for cement (www.stlawrencecement.com, September 2004). The company reports no significant changes at the Mississauga cement plant in 2004.

Clay / Shale Products

Southwest Ontario contributes 95% of Ontario's brick production. The $185 million of estimated production from this District in 2003 represents almost 80% of Canada's production.

In 2004, four companies extracted shale from 6 quarries in southwest Ontario for heavy clay products, supplying 6 brick and tile manufacturing operations within the District. Two large operators, Hanson Brick and Brampton Brick, have both quarrying and manufacturing facilities. One smaller operator, Century Brick, also has both quarrying and manufacturing facilities. These companies extract Queenston shale in the area between north Brampton and Hamilton. A small quarry operated by JADE Hardwoods Inc. near Thedford, Ontario, supplied shale to Paisley Brick and Tile Co. and other customers. Arkona Formation shale forms the resource rock at the Thedford Quarry. Over 1.25 million tonnes of shale was extracted from the 6 quarries.

In 2004, these 6 brick-making plants produced over 700 million modular brick equivalent units, the industry standard measure. More than 80% of these bricks were sold for residential construction, dominantly in southern Ontario. The remainder was used in architectural, industrial and institutional construction. All producers reported that demand for brick products continues to be good in the main Toronto – Golden Horseshoe market and across North America.

Shale quarries and brick-making plants employed approximately 525 in southwestern Ontario in 2004.

In 2004, Hanson Brick quarried Queenston shale at their Milton, Burlington and Aldershot quarries located between Toronto and Hamilton. Hanson Brick operated 3 large brick plants, a plant at Aldershot and 2 adjacent to their Burlington Quarry. Production capacity at the Hanson Brick plants is approximately 500 million modular brick equivalent units per year.

Brampton Brick Ltd. trucked Queenston shale from their Cheltenham Quarry a distance of 10 km to their brick plant in northwest Brampton. The Brampton plant has a capacity of approximately 300 million modular brick equivalent units per year.

Century Brick operated a quarry near Georgetown that supplied a brick plant in downtown Hamilton. The plant produced over 16 million modular brick equivalent units in 2004.

The brick products industry in Ontario currently extracts almost all of its resource materials from the Queenston Formation shale. Queenston Formation occupies a narrow, wedge-shaped area located immediately east of the Niagara Escarpment and extends from Georgian Bay to the Toronto and Hamilton areas. In addition, Queenston Formation underlies most of the lands along the Niagara Peninsula, which are below the Niagara Escarpment. Much of the area underlain by the Queenston Formation is already highly urbanized. Urban expansion of the Greater Toronto Area, land use planning initiatives to preserve green space, prime agricultural and natural heritage lands, and infrastructure corridors are increasing major threats to the long-term continuity and development of the brick industry in Ontario, by occupying areas containing increasingly scarce, accessible Queenston shale resources.

COMPANY AND INDUSTRY NEWS

JADE Hardwoods Inc. purchased the business of George Coultis and Son Ltd. in May 2004. This transaction included the Thedford Quarry that is adjacent to the sawmill operations. The remainder of the year was occupied with organizing the quarry and its administration, and the extraction of a small amount of shale (A. Vezina, personal communication, January 2005).

In March, Brampton Brick Ltd. reported its year-end financials for 2003. Net sales increased by $9.16 million or 9.8%, to $102.68 million on the strength of higher brick shipments and other factors. In the first two quarters of 2004, Brampton Brick net sales increased by 19% and 5.7% from the previous year, again on the strength of higher brick shipments. However, by the third quarter, it was reported that net sales decreased by $2.86 million from $33.17 million in 2003 to $30.31 million in 2004, primarily due to lower brick shipments in the Ontario market. Persistent rainy weather, a strike during the second quarter by the road and sewer construction trade union and the additional time now required by land developers and builders to obtain all necessary approvals combined to cause a slowdown in residential construction activity in the third quarter. In addition, sales to dealers and distributors were much higher in the first half of 2004 compared to the first half of 2003, the positive effects of which have been partially offset by a decrease in sales to these customers in the third quarter. Lower shipments in the Ontario market were partially offset by an increase in shipments to the U.S. (www.bramptonbrick.com).

Hanson Brick, as noted in a later section (see "Advanced Exploration and Development", "Shale / Brick"), in 2005 intends to reopen the Niagara-on-the-Lake Quarry and license and produce from the new Tremaine Quarry. Shale resources in the Milton Quarry and Burlington Quarry have been exhausted, and limited or no production will occur from these sites in 2005 (A. Norris, personal communication, January 2005).

COMPANY SPOTLIGHT – HANSON BRICK ALDERSHOT BRICK PLANT

In October 2004, a field trip organized by the Canadian Institute of Mining, Metallurgy and Petroleum visited this plant. The following is an excerpt from the field trip guidebook (Steele 2004).

> In May 2002, Hanson Brick's new Aldershot quarry and brick plant were officially opened. The $60 million plant, one of the most sophisticated in North America, uses 4 industrial robots. In its first year it produced over 150 million modular brick equivalent units or enough bricks to build 10 000 new homes. The Aldershot Quarry and Brick Plant are located on 72 ha in the west-end of Burlington.
>
> The quarry is located immediately north of the new brick plant. Two closed landfill sites, the Halton Region landfill on the west and the Bayfield Park landfill to the east enclose the quarry site. A second quarry, referred to by the company as the "centre and east quarry" is located nearby off King Road. Halton Ceramics Ltd previously quarried part of the quarry site. National Sewer Pipe Ltd previously operated a portion of the centre and east quarry site.
>
> The quarry exposes Queenston Formation shale along the base of the Niagara Escarpment. The Aldershot location has access to an approximately 50 m thick section near the middle of the 150 m thick Queenston Formation section in the Milton-Hamilton area. Upper sections of the quarry expose low-carbonate, generally massive, red shale, with locally developed lenses of green-grey siltstone. More towards the base of the quarry is higher-carbonate, interbedded red and grey-green shale, with significant gypsum as nodules and redeposited "secondary" layers. Gypsum is significant as a

deleterious component in brick manufacturing, staining bricks and in extreme cases, causing corrosion of the brick kilns. Adding barium carbonate to stop surface scum on bricks can neutralize the gypsum.

One of the criteria used to evaluate shale for brick manufacture is carbonate content. As carbonate content increases, the brick colour lightens from red to yellow or buff. The CO_2 content of the shale at Aldershot is approximately 6%. Shale with CO_2 content below 10% generally produces red bricks whereas materials over that content produce yellow bricks.

To feed the plant, Queenston shale is extracted. Large bulldozers rip and push the shale into huge stockpiles for weathering and aging. Queenston shale quickly softens through natural weathering; this improves plasticity and workability for the brick making process. A large front-end loader moves the aged raw material from the large piles to the primary crusher.

At current brick manufacturing rates, the quarry contains resource to meet the factory's needs for the next 40 years.

The plant's location is directly beside and in front of the quarry. Care went into the design and construction of the new factory, including the grading of the site to ensure that the plant cannot be seen from the nearby Highway 403. The plant footprint covers 23,000 square metres.

The raw material goes through an initial crusher at a rate of 125 tonnes per hour. The material is then conveyed to the grinding room where it is continuously ground and screened. Upon reaching a consistency close to beach sand, the material is conveyed to a mixer where moisture is added. The material is then moved to storage bunkers. An automatic device travels across the piles of processed material transferring it onto a conveyor, which takes the material to a surge hopper in the mill room.

From the surge hopper, the processed material is conveyed to a mixing device called a pug mill. There the final addition of moisture takes place to get the material to the desired plasticity for extrusion. Water is added to increase the moisture content to approximately 12%. At the extruder, air is removed and the material is squeezed into a column. This continuous column is then textured, and colour may be added by using liquid additives and pigment-laden sand depending on the product. Residential bricks are surface coated products as the marketplace is more tolerant of variations in shale colour. In contrast, institutional, commercial and industrial bricks are uncoated or through the body colour. The column is then cut into slugs, which pass through a wire cutter for final sizing.

Aldershot uses the latest technology in cutting systems to enhance edge quality on textured brick. Once cut into brick, four robot arms set the brick onto waiting kiln cars ready to transport them to the dryers. Each robot can set 5760 brick units per hour.

Once the bricks are set, the car is automatically transferred to the tunnel dryers. There is one dryer for each kiln. To dry the brick, waste heat is captured at the end of the kiln and blown into the dryers at approximately 225°C to reduce the moisture content of the brick. In the dryer, the moisture content of the product is reduced from approximately 12% to less than 1%. After drying is complete the cars are transferred to the natural gas-fed tunnel kilns where they will spend approximately 25 hours. The bricks are subjected to a predetermined temperature profile that takes the product from 225°C to in excess of 1060°C. At these high temperatures the shale vitrifies giving it strength, beauty and permanent colour. The kilns are major gas consumers; gas costs are a significant portion of overall production costs. After firing, the brick continue through the kiln for a controlled cool down. All the functions of this process are controlled by a computer system.

With the kiln firing process complete, the cars are moved into the packaging area. Four robotic arms are used to remove the brick from the kiln cars for placement on an inspection conveyor. The brick are then stacked into a delivery cube, which is secured by plastic strapping. At Aldershot, Hanson Brick's unique twin pack system facilitates safer handling of the product on the jobsite. From the packaging line, the finished package is transferred by forklift into the paved storage area to await shipment.

A limestone scrubbing system and recycling techniques minimize waste and assure that the plant meets the highest environmental standards and government regulations.

Production from the plant is over 150 million brick units per year. Currently, 90% of production is used in new home construction, mostly in southern Ontario, and 10% is supplied for institutional, commercial and industrial structures.

Chemical, Metallurgical and Filler Limestone and Dolostone

Ontario's lime industry is primarily situated in the Southwest Ontario District. Within the District in 2004, three quarrying operations extracted limestone or dolostone for use in the lime, chemical, metallurgical and filler products industries. Southwestern Ontario limestone is also sold for aglime, aggregate, landscaping and engineering uses. Carmeuse Lime Canada Ltd – Beachville Operations, located between Woodstock and Ingersoll, produces high-calcium lime from Lucas Formation limestone. Carmeuse Lime Canada Ltd. – Dundas Operations produces dolomitic lime or dolime from Guelph Formation rock purchased from the adjacent Dundas Quarry of Lafarge Canada Inc. E. C. King Contracting extracts glass-grade dolostone from the Amabel Formation at the Sydenham Quarry near Owen Sound. The Carmeuse operations are a part of the Carmeuse North America group, which, based in Pittsburgh, PA, is one of the big three lime producers in North America. The other major players are Graymont Inc. and Chemical Lime Company.

Lime, dolime, and high-purity limestone and dolostone markets are dominated by the demand for product from the steel making industry. After a number of poor years in the steel industry, in 2004 lime producers benefited from strong steel production and lime demand, with Ontario's major producer, Carmeuse, reporting lime volume sales up 9% (Blendon Information Services, December 2004) and overall Great Lakes area shipments up 14% from the five-year average (Lake Carriers' Association, July 2004).

Though the steel industry is the dominant market, sales into other markets are gaining ground, including float glass, filler and environmental uses.

Ground calcium carbonate (GCC) is one of the most widely used industrial minerals for a number of applications, due to characteristics such as widespread availability, low cost, good white colour, low oil absorption, and a wide range of particle sizes. It has become an increasingly important functional additive in product formulations as processing techniques have improved quality. Carmeuse at its Beachville operations produces GCC and lime used in various industries, including paper, plastics, and rubber, as well as chemical, construction, fertilizers, glass and metallurgy.

The investment in flue gas desulfurization (FGD) technologies to remove SO_2 from power plant exhausts is already sizeable in the United States and is expected to rise significantly. It is estimated that power plant operators in North America will order FGD systems costing over US$30 billion in the next 7 years. As a result, requirements for limestone, lime and other reagents will steadily increase. The bulk of the systems in operation and those built in the future will use high-purity limestone. Worldwide consumption of limestone and lime for FGD is forecast to exceed 40 million tons per annum by 2010. The FGD market represents an important strategic focus for limestone and lime producers in Ontario (*Industrial Minerals*, November 2002). The demand for stone used in FDG within the Great Lakes market is predicted by Lafarge North America to grow from 3.7 million tons to 4.7 million tons (*Great Lakes/Seaway Review*, April-June 2004).

Quarries extracting limestone or dolostone for use in the lime, chemical, metallurgical and filler products industries, and associated on-site processing plants, employed approximately 200 people in southwestern Ontario in 2004.

COMPANY AND INDUSTRY NEWS

In January 2005, the Carmeuse Group of Belgium completed the purchase of Lafarge SA's 40% interest in Carmeuse North America (CNA) for US$140 million. Carmeuse and Lafarge formed CNA in 1998 with the combination of their North American lime operations. The transaction ended an uneasy five-year partnership. CNA is a producer of lime and limestone products and operates 14 plants in Canada and the United States including 2 in southwest Ontario. In 2004, the company made an operating profit of US$20-25 million on revenues of approximately US$450 million.

Carmeuse has stated that the acquisition of Lafarge's interest in CNA is part of a strategy to integrate completely its lime operations owned in North America and Europe. The group has already been successful in taking full control of its European operations through the purchase in 2003 of the lime assets owned by Heidelberger Zement. Carmeuse indicated there are no expected changes in CNA's activities, however, it is noted that there is no longer the threat of

the company being sold and capital expenditures decisions, for example, not being overshadowed by disputes or litigation between the shareholders. Carmeuse has stated that it would finance the purchase of Lafarge's interest in CNA by refinancing CNA's debt (including subordinated debt owned by Carmeuse), but also by sale of non-core assets eventually combined with equity reinforcement. None of CNA's assets are regarded as being non-core (Blendon Information Services, January 2005).

It had previously been reported that Lafarge was seeking to end the joint venture, divest its specialty products businesses and concentrate on core businesses including the production of gypsum, cement and aggregates (Blendon Information Services, September, 2004; *Industrial Minerals*, November 2004).

In December, CNA announced a net profit of EURO7.5 million (US$10.0 million) on sales of EURO314.6 million (US$417.9 million) compared with a net loss of EURO6.9 million (US$9.2 million) on sales of EURO303.3 million (US$402.8 million) in the first nine months of 2003. CNA's lime volume sales, fuelled by increased demand from the steel industry and utility customers, grew 9%. The company's growth in profits, however, was negatively impacted by an 11% increase in natural gas and coal prices, and higher transportation and maintenance costs (Blendon Information Services, December 2004).

Earlier in the year, CNA reported significant increases in lime and limestone sales volumes and a modest increase in prices. The company also reported that its operations were benefiting from strong steel production and the demand for lime was outpacing previous expectations (Blendon Information Services, June 2004).

Dimension / Building Stone

In 2003 in the Southwest Ontario District, materials for dimension, building and landscape stone uses were extracted from 28 quarries operated by 22 companies (see Figure 1). A limited number of these quarries also extracted stone that was crushed and used as aggregate.

The primary market for stone is southern Ontario and the Great Lakes region of the United States, with limited additional product being shipped to more distant markets.

Quarries extracting limestone, dolostone, sandstone and gneiss for dimension, building and landscape stone use, and associated on-site processing plants, employed approximately 525 people in southwestern Ontario in 2004, including approximately 465 in the Wiarton – Owen Sound area (personal communication with most quarry owner/operators, 2004-2005).

Most stone quarry operators indicated that the demand for stone outstripped supply in 2004, particularly those supplying Eramosa Member dolostone ("marble") and Whirlpool Formation sandstone. Many of these operators reported 2004 as a "good" or "the best" year and "cannot meet demand", with most predicting a strong market to continue into 2005. In 2004, many stone producers purchased new extraction and processing equipment, and a number constructed new on-site buildings. Some companies debuted web sites in 2004.

WIARTON AREA QUARRIES

The largest concentration of stone producers in the Southwest Ontario District is in the Wiarton area where 14 operations extracted Eramosa Member dolostone for dimension, building, landscaping and flag stone markets, 2 operations quarried Amabel Formation dolostone for dimension and buildings stone uses and 1 quarry produced Guelph Formation dolostone for building and landscape stone sales. A selection of these operations is noted in the following sections.

Owen Sound Ledgerock Ltd., the largest stone quarrying and processing operation in Ontario, cut and polished Eramosa Marble and other dimension stones using over 100 large-format stone-cutting machines. The company started a tile production line in 2004. In addition, during the year Owen Sound Ledgerock Ltd. started construction of a new corporate headquarters at the Owen Sound Quarry location, opened a new retail store on Highway 6, purchased another primary saw and other equipment and expanded one processing building. The company has approximately 180 staff. The company operates 3 Eramosa stone quarries in the Wiarton area. Within the last year,

the company has started a new quarry for Amabel Formation dolostone, which is marketed under the "Hope Bay" name. The company also has supply arrangements with quarries in the Orillia area and on Manitoulin Island to obtain "Mara" and "Silverwater" marbles (S. McCallum, personal communication, January 2005).

Limberlost Stone Inc. started operations of an Eramosa Member quarry in Albemarle Township in 2003. The company supplies light brown, dark brown and grey dolostone as cut and random flagstone, landscaping stone, building stone, coping and coursing. Already employing 24 staff at peak periods, the company is planning on expanding and hiring more staff in 2005 (D. McCutcheon, personal communication, January 2005; www.limberloststone.com).

For over 50 years, Ebel Quarries Inc. has extracted quarry blocks from the Eramosa Member at the Ebel Quarry, in addition to other material for building and landscape stone products. The company's nearby Arnold Property Quarry saw limited production in 2004, with expanded production expected in 2005. The operation uses over 20 stone cutting, splitting and processing machines, including recent purchases of a slab saw and bush-hammering machine (M. Ebel, personal communication, January 2005; www.ebelquarries.com).

Bruce Peninsula Stone Ltd. quarried Eramosa stone at its Wiarton Quarry, and at the Lindsay Quarry on the northern portion of the Bruce Peninsula extracted Guelph Formation dolostone. To gain some of the expanding cut and processed building and landscaping stone markets, in 2004 the company made a significant investment in new equipment and the structures to house them for year-round production (E. Shouldice, personal communication, January 2005).

Arriscraft International Inc. operated the Adair Marble Quarry just north of Wiarton. Blocks of Amabel Formation dolostone are extracted and either processed on-site or transported to the company's Cambridge, Ontario, processing plant. The quarry has been in continuous operation since 1963. Annual capacity exceeds 30 000 tonnes of quarry blocks suitable for up to 60 000 m^2 of slabs and cut stone products. The quarried stone is used for both horizontal and vertical building and landscaping elements, such as wall cladding and veneer, caps, copings, column covers, pavers, stair treads and retaining walls. When polished, it is also appropriate for use as marble flooring, interior wall cladding, washroom partitions and screens, table and counter tops. Standard surface finishes available from the company include sawn, split, rocked, medium-dressed, and fine-dressed. Custom finishes include bush-hammered and polished. "Adair Marble" is available in 2 distinct colours: blue-grey and sepia. Both colours are available in 2 distinct patterns, resulting from the stone's natural tendency to form with a vein running along the horizontal axis. When cut into slabs, the direction of the cut will determine the surface pattern created by the veining. These are typically referred to as fleuried or striated. In 2004, Adair was featured on buildings such as the Carpenters and Joiners Headquarters, Constitution Avenue, Washington, DC; and the Brockville Hospital, Ontario (B. Ratcliffe, personal communication, January 2005; www.arriscraft.com).

SANDSTONE QUARRIES

In the Georgetown–Inglewood area, white and maroon Whirlpool Formation sandstone was extracted at the Deforest Brothers Quarry, Rice & McHarg Quarry, and Hilltop Stone and Supply Quarry for the production of squared and irregularly shaped dimension and landscaping stone. The combined output from these 3 small-scale quarries is less than 10 000 tonnes of stone annually

ORILLIA AREA QUARRIES

In the Orillia area, Gull River Formation limestone was extracted for sale as building and landscape stone by 5 companies: Rockleith Quarry Ltd.; Speiran Quarries Ltd.; Cut Above Natural Stone; Stone Cottage Inn Ltd.; and MAQ Aggregates. At the Rama Stone Quarries Ltd. property, Fowler Construction quarried gneiss for landscape stone, and crushed stone for premium-quality and specialty aggregate. In 2004, Owen Sound Ledgerock Ltd. took quarry blocks from the Stone Cottage Inn Ltd. property for processing into tiles and other products at their Owen Sound plant. Rockleith Quarry Ltd., which commenced quarrying in 2002, has been increasing its stone processing capabilities. In 2004, the company produced significantly increased volumes of value-added dimensional stone products by using additional saw and guillotine machines (G. Harper, personal communication, February 2005; www.rockleith.com).

Aggregate

Crushed stone aggregate is a major mineral commodity produced in southwest Ontario. The buoyant economy of southern Ontario is producing strong demand for both crushed stone and sand and gravel aggregate products. Lafarge North America, a major aggregate producer, late in 2004 reported that sales volumes were up 10% in Canada compared with the previous year, reflecting higher levels of infrastructure activity (*Pit & Quarry*, December 2004).

In July/August 2004, *Aggregates & Roadbuilding* published their annual listing of Canada's top 20 stone quarries. For 2003, 7 of Canada's top 20 quarries were located in the Southwest Ontario District, including 2 of the top 3. All are primarily aggregate quarries with the exception of the Ingersoll Quarry, which supplies high-purity limestone for the chemical industry. The Southwest Ontario quarries, showing ranking and 2003 production, are:

Quarry Name and Operator	National Ranking	2003 Production
Milton Quarry, Dufferin Aggregates	1	4.71 Mt
Dundas Quarry, Lafarge Canada	3	4.25 Mt
Acton Quarry, Dufferin Aggregates	9	2.46 Mt
Burlington Quarry, Nelson Aggregate	11	1.83 Mt
Brechin Quarry, Lafarge Canada	12	1.76 Mt
Ingersoll Quarry, Carmeuse North America	13	1.69 Mt
McGregor Quarry, Amherst Quarries	17	1.14 Mt

(*Aggregates & Roadbuilding*, July/August, 2004)

The main rock formations quarried for crushed stone aggregate are Gull River, Bobcaygeon, Lockport, Amabel, Guelph, Bois Blanc, Dundee, and Lucas. The major crushed stone source areas are along the Niagara Escarpment and east of Lake Simcoe. Most of the production is trucked to local major urban centres.

Sand and gravel is also a major mineral commodity produced in southwest Ontario. The major sand and gravel source areas include along the Oak Ridges Moraine, and outwash deposits within Caledon and Puslinch townships, and between Cambridge and Brantford. Most of the material is trucked to local major urban centres.

COMPANY SPOTLIGHT – FONTHILL KAME AND LAFARGE CANADA FONTHILL PIT

In October 2004, a Canadian Institute of Mining, Metallurgy and Petroleum field trip visited an important sand and gravel operation on the Niagara peninsula. The following is an excerpt from the field trip guidebook (Steele 2004).

> The most prominent feature and the highest point of the Niagara Peninsula occur at Fonthill. The Fonthill kame deposit constitutes the most important natural (sand and gravel) aggregate deposit in the Niagara Peninsula. The high-grade core of the kame contains 86 million tonnes within an area of 820 ha of materials suitable for a range of road-building and construction aggregates. The peninsula as a whole has very limited resources of sand and gravel, and the Fonthill Kame deposit constitutes a resource area of strategic importance in minimizing the cost of construction in the region.
>
> The Lafarge Fonthill Pit has been in operation for 60 years, under several owners including TCG, Blue Circle and currently Lafarge Canada. Current production is approximately 700 000 tonnes per year.
>
> Pit operations use a Caterpillar 385 BL excavator and three Caterpillar 773 rock trucks to extract and transport material over a distance of 1.6 km from the pit face to the plant. Up to 6800 tonnes of material is hauled per 9 hour shift. The main products shipped from the site are concrete sand, asphalt sand, septic sand fill, masonry sand, cable sand and 19 mm crusher run.
>
> Rehabilitation has started on site. Currently 53 acres have been planted as a tender fruit orchard, with peach, cherry and pear trees. In addition, 8 acres are planted in corn.

ADVANCED EXPLORATION AND DEVELOPMENT

With the advanced exploration, development and permitting work done in 2004, up to 6 new or re-activated mineral extraction operations could start production in 2005. In the following sections, a selection of projects is highlighted.

Shale / Brick

Hanson Brick Ltd. announced that the Niagara-on-the-Lake Quarry, which last produced in 1980, would be re-activated in 2005 to supply Queenston Formation shale to the company's 2 Burlington brick plants. In addition, Hanson Brick has applied for a license to open a new Queenston Formation shale quarry off Tremaine Road within the City of Burlington. The 38.5 ha site has an estimated 13 to 14.5 Mt of accessible resource.

Aggregate

Two companies on the western edge of the Greater Toronto Area have applied for new zoning and licenses to extract Amabel Formation dolostone for high-quality aggregate products. Both are "green field" sites. Lowndes Holdings Inc. has a site within the northeast corner of City of Hamilton and with approvals would extract 3 Mt annually. James Dick Construction Ltd. intends to extract 2 Mt per year from its Town of Caledon location.

High-Calcium Limestone

Fortune Minerals Limited/Formosa Environmental Aggregates Ltd. owns 107 hectares in the Municipality of Brockton in South Bruce County, underlain by patch reefs comprising high-purity calcium carbonate within the Amherstburg Formation. Formosa intends to develop the Greenock Quarry on its property to mine a 15 Mt resource, grading 99% calcium carbonate. The product will be suitable for application in a number of chemical, industrial, environmental, agricultural and construction materials markets. The company has received all the requisite Official Plan and zoning amendments and continues monitoring of Greenock Creek and a number of test wells on the property. As of January 2005, discussions between Fortune Minerals Limited/Formosa Environmental Aggregates Ltd. and the Ministry of Natural Resources continue with regard to the site plan and other issues. A development license has yet to be issued.

Dimension / Landscape Stone

Proponents of several dimension/building stone projects have started the licensing process under the *Aggregate Resources Act*. The projects include a Gull River Formation limestone quarry in Rama Township, applications to quarry Eramosa Member dolostone/marble in Keppel, Albemarle and Amabel townships, and a Guelph Formation dolostone quarry in Lindsay Township. These applications and projects are at varying stages within the licensing process.

Cement Stone

Federal White Cement is the only manufacturer of white portland cement in Canada. In 2003, approximately 250 000 tonnes were produced, with about 75% exported to the United States. The company currently has a license to quarry in the Woodstock area, however, they have not as yet extracted rock, choosing rather to purchase raw materials from local and other sources. There is an ongoing process to expand the aggregate license of Federal White Cement Limited in Zorra Township in preparation for future possible extraction.

St. Marys Cement Inc. has applied to amend the current site plan at its Bowmanville Quarry. The application has been made to allow a lowering of the final elevation of the quarry floor from 11.0 m above sea level to a depth of 113.0 m below sea level. The current quarry is approximately 66 m deep, with 10 m of overburden overlying 56 m of Lindsay Formation limestone. If approved, the quarry would have a final depth of 188 m and provide approximately 30 additional years of feed for the on-site cement plant.

EXPLORATION ACTIVITY

All exploration activity in the Southwest Ontario District occurs on private land, hence there is no requirement for companies or individuals conducting mineral exploration to file assessment reports with the Ministry of Northern Development and Mines or to contact the Southwest Ontario District Geologist office. Through informal discussions and research, however, staff of the Southwest Ontario District Geologist office acquire information on most property acquisition interests or exploration projects for such commodities as high-purity limestone/dolostone, salt, gypsum, sandstone, limestone/dolostone/marble, dimension/building stone, cement, shale and zinc.

Numerous companies and individuals contacted the Southwest Ontario District Geologist office throughout 2004 for information and/or advice with respect to exploration areas, commodities, exploration methods, processes for acquiring mineral properties and exploration opportunities. Confidentiality and private land issues surrounding the competitive and market-driven nature of the industrial minerals industry impedes disclosing the identities of companies and/or individuals exploring in southwest Ontario and/or the locations of their prospects. Most exploration centres on the commodities that are currently experiencing strong market conditions, including aggregate, dimension/building stone, shale/brick, limestone and dolostone.

HudBay Minerals

HudBay Minerals Inc., known prior to December 2004 has OntZinc Corporation, has an exploration project for Mississippi Valley-type (MVT) zinc mineralization in southwestern Ontario. A geological setting similar to that hosting the major MVT districts of North America underlies southwest Ontario. Zinc-in-groundwater anomalies indicates the potential for a mineral district with a potential strike length in excess of 100 km that correlates with the Silurian age Guelph Formation barrier reef complex and that lies at depths of 100 to 400 m below surface. Geophysical and geochemical exploration has defined 24 zinc anomalies that suggest the presence of a district-sized exploration target. HudBay Minerals holds approximately 10 500 hectares of mineral leases. Leases are generally for 10 years with annual payments of $2 per acre and subject to a net smelter royalty of 1.0% to 2.5%. Exploration expenditures to June 2004 were $670 000. The company began a major exploration program in the last quarter of 2004, with an initial expenditure of $1 million (P. George, HudBay Minerals, personal communication, December 2004; ONTZinc Corporation press releases, 2004; www.ontzinc.ca).

The exploration for zinc in southwestern Ontario has raised questions and curiosity. The project has been profiled in several newspaper articles, with national to local exposure. Some of the headlines include:

- "Undermining paradise: OntZinc: A mining company is persuading some Ontario farmers to lease their land for exploration. Not everyone however, is willing to sign on." (*National Post*, May 22, 2004)
- "Sitting on a question mark; Zinc explorations north of Stratford have landowners intrigued, but sceptical" (Kitchener-Waterloo-Cambridge, *The Record*, March 6, 2004)
- "Area eyed for zinc mine; Company buys up mineral rights from Stratford to Harriston" (Kitchener-Waterloo-Cambridge, *The Record*, January 28, 2004)

MMIC AND DISTRICT GEOLOGIST STAFF AND ACTIVITIES

During 2004, C. Lee and D. Hemmings (January-May) staffed the Mines and Minerals Information Centre (MMIC), with support from D. Farrow (January-March), K. Steele (April-December) and M. Barua of the District Geologist's office. The Southwest Ontario District Geologist office is co-located with MMIC. C. Lee, Regional Support Geologist for Southern Ontario, supplied lead service for MNDM's online information system, the Earth Resources and Mineral Exploration website (ERMES), and for MMIC library functions and Publication Sales. D. Hemmings provided customer service to front counter sales, telephone inquiries, and assisted the District Geologist as required.

K. Steele, Southwest Ontario District Geologist, provided expertise regarding the geology, resources, and minerals industry in southwest Ontario with the assistance of M. Barua, the Southwest District Support Geologist. K. Steele

was on secondment to the MNDM Corporate Policy Secretariat for the period January-March 2004. During that time, D. Farrow was the Acting District Geologist. All publicly available geological files, mineral deposit records and reference materials for the Southwest Ontario District are available for viewing at the MMIC.

Through the Ontario Summer Experience Program, J. Taylor and P. Landry assisted clients at the MMIC and provided research assistance and support to public outreach projects conducted by MMIC and the Southwest Resident Geologist Program.

During 2004, MMIC and Southwest Ontario District staff assisted approximately 4600 clients who visited or contacted MMIC/Southwest District office, as well as dialogued with an estimated additional 1400 clients at various conferences and trade shows. Staff responded to a wide variety of inquires, the most frequent requests being for information focused on the following southern Ontario commodities and topics:

- aggregate, limestone, dolostone, high-purity limestone, high purity dolostone, building/dimension/landscape stone, sandstone, marble, Eramosa Marble, salt, shale/brick, clay, lead/zinc, mica, peat, granite, kimberlites and/or diamonds, chert, groundwater, quartz, feldspar, silica;
- surface and mineral rights, prospectors licenses, claim maps, assessment work, exploration on private land, Mining Act, Aggregates Resources Act, drilling regulations and techniques, drill hole records, geophysical surveys, geochemical sampling, property evaluations, drift thickness, Abandoned Mines database, Aggregate Producers Association of Ontario, Prospectors and Developers Association of Canada, Ontario Prospectors Association, Toronto Geological Discussion Group, Toronto Branch of Canadian Institute of Mining and Metallurgy, Geological Survey of Canada;
- fossils, gemology, Bancroft Gemboree, roadside geology, mineral collecting sites and references, guidebooks, Geoscape Toronto, PDAC Mining Matters, field trips;
- mining industry jobs, geology courses, conferences; and
- Trafalgar Moraine, Oak Ridges Moraine, Niagara Escarpment, Don Valley Brickworks Park.

Industry Interaction

District staff participated in a number of industry organizations, field trips, publications, conferences, trade shows and meetings in 2004.

The District Geologist was active all year on the Executive Committee of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Toronto Branch. The District Geologist continued to participate on the Prospectors and Developers Association of Canada (PDAC) Education Committee.

In February, the on-secondment District Geologist, in co-operation with and hosted by The Canadian Salt Company Limited, arranged and accompanied the Minister of Northern Development and Mines, the Honourable Rick Bartolucci, on a tour of the company's Ojibway Mine and Evaporation Plant at Windsor. The February 20th tour was also attended by A. Dostal, L. Maskell and T. Bender, staff of the Minister's Office, and D. Tyler, staff member of the office of the Parliamentary Assistant to the Minister of Northern Development and Mines.

The mine tour was lead by J. Vincent, Mine Manager and current Chairman of the Ontario Mining Association. The company mines rock salt at the Ojibway Mine, located along and under the Detroit River in the southwest corner of the City of Windsor. The mine operates on company-owned lands and has a lease from the provincial government to mine rock salt under the Detroit River. The mine operates under the *Mining Act* administered by the MNDM. The mine extracts salt from the 7.5 m thick layer of the Salina Formation located approximately 295 m below the ground surface. In 2003, production from the Ojibway Mine was 2.7 Mt of salt, most of which was shipped by vessels around the Great Lakes for de-icing roads.

The second part of the tour visited the Windsor Fine Salt Facility (brine field and evaporation plant) located approximately 3 km north of the Ojibway Mine. M. Soave, the Facility Manager, led the tour. The brine field is operated under the *Oil, Gas and Salt Resources Act* administered by MNR. Evaporated salt or "fine salt" is a high-

purity granulated salt and is mainly sold for food processing, including table salt, and for industrial chemical manufacturing, farm uses, and as water softening pellets.

In March, at the PDAC Annual Convention in Toronto, Southwest Ontario District staff participated by:

- supplying materials for the Resident Geologist Program display. The acting District Geologist for Southwest Ontario helped staff the display.
- K. Steele, the on-secondment District Geologist, chaired a technical session focusing on activities and highlights of Provincial Geological Surveys and Ministry of Mines.

In March, the District Geologist participated in the Ontario Mining Association's (OMA) "Meet the Miner" reception at the Ontario legislature. The mining industry of southwest Ontario was well represented by the mine managers from both of the District's operating salt mines. J. Vincent, manager of The Canadian Salt Company Ltd.'s Ojibway Mine at Windsor, is the current Chairman of the OMA.

In April, the District Support Geologist attended the Northeastern Ontario Mines and Minerals Symposium in Sudbury. More than 320 registered delegates listened to presentations that highlighted gold, diamond and base metals activities throughout northeastern Ontario. Three southern Ontario-focused posters presented at the symposium highlighted Mineral Production, Mineral Exploration and Recommendations for Exploration.

Two oral presentations had direct connections to the Southwest Ontario District:

- "Ontario's Industrial Minerals - Essential and Dynamic" by M. Gerow and P. Sangster, MNDM
- "Exploration for Zinc-Rich Mississippi Valley-type Targets in Southwestern Ontario" by P. George, OntZinc Corp.

The first presentation emphasized the dynamic nature of industrial minerals, including their diverse uses and applications and their 41% contribution to the total value of Ontario's mineral production. The presentation also highlighted the numerous current exploration and development projects for a variety of industrial minerals in Ontario. Approximately 28% of Ontario's overall mineral production revenue comes from the extraction of industrial minerals in the Southwest Ontario District.

The second presentation highlighted OntZinc Corporation's exploration activities for zinc-rich ore bodies in southwestern Ontario. The company holds about 6800 hectares of mineral leases and indicated it is hopeful of encountering one or more orebodies out of its 24 selected targets in its proposed drill program. OntZinc believes that the recent developments of MMI (mobile metal ion) and Quantec Titan24 geophysical technologies and the excellent coincidence of groundwater geochemistry, soil geochemistry, geophysics and the Mississippi Valley Type geological model will lead to a successful project.

In May, the Geological Association of Canada (GAC) and Mineralogical Association of Canada (MAC) jointly hosted their annual conference entitled "Lake to Lake" in St. Catharines. The District Geologist participated in a pre-conference field trip, presented to and attended technical sessions, and joined one business meeting.

As part of the "Lake to Lake" conference, A.F. Bajc and P.K. Karrow led a two-day field trip entitled "3-dimensional mapping of Quaternary deposits in the Regional Municipality of Waterloo, southwestern Ontario". The cornerstone of groundwater source protection lies in geology where a detailed understanding of the properties and 3-dimensional architecture of subsurface sediments and rock is essential if well-informed decisions regarding land use and nutrient application in rural areas are to be made. The Regional Municipality of Waterloo is the largest municipal user of groundwater in Canada. In an attempt to assist the Region with its Source Protection Plan and Long Term Water Strategy, the Ontario Geological Survey (OGS) has embarked on a project of 3-dimensional geologic mapping of the Quaternary sediments. The field trip gave participants an overview of the important elements of the glacial geology of the region, focusing on key stratigraphic and hydrostratigraphic units and geomorphic features such as the Waterloo Moraine. Staff of the Grand River Conservation Authority (GRCA) provided an overview of the organization's activities and mandate, as well as how the organization makes extensive use of surficial geology data. Approximately 5 years ago, the District Geologist Southwest Ontario assisted in creating a common legend of surficial geology map units for the GRCA.

The following conference technical sessions and presentations, all directly relevant to mineral issues in southern Ontario, were attended by the Southwest Ontario District Geologist:

- The Niagara Escarpment: Earth Science and Environmental Planning
- Paul F. Karrow Symposium – Reviews and Reflections on Quaternary Sciences
- Groundwater Resources: Regional Hydrogeology in Southern Ontario
- The Earth Sciences and Wine
- Enhancing Earth Science Awareness and Education

In the last session noted above, the District Geologist presented the paper "Geoscape Toronto – A Toolkit for Learning About and Planning for Great Changes in the Greater Toronto Area".

At the business meeting for the Canadian Geoscience Education Network, the following selected items/topics/issues were presented and discussed:

- EarthNet
- EdGEO
- Geoscape project, a national summary
- What on Earth, produced by University of Waterloo
- Careers in Earth Sciences initiative
- PDAC Mining Matters
- OGREnet, led by the University of Western Ontario

In May, the District Geologist, in partnership with other Southern Ontario Resident Geologist Program staff, exhibited at the Organization of Small Urban Municipalities (OSUM) conference in Owen Sound. OSUM is associated with Association of Municipalities of Ontario and represents communities across southern Ontario with between 5000 and 50 000 citizens. The conference is attended by municipal staff, managers and politicians and affords an excellent venue to highlight MNDM's role in land-use planning and promoting development of mineral resources. The MNDM exhibit was entitled "Minerals Matter – Geological Survey maps in support of economic development, land-use decisions, and public safety and health".

In June, the District Geologist attended the Association of Professional Geoscientists of Ontario Annual General Meeting in Toronto. The highlights of the past year were presented and included:

- a membership total of over 1100
- a year end operating surplus
- an expanded website and improved member communications
- a complaints process and the near completion of a discipline process
- the adoption of various professional practice guidelines for several areas of practice and the development of others
- the implementation of the Quebec-Ontario Inter-Provincial Mobility Agreement
- the initiation of public awareness concerning the impact of the *Professional Geoscientists of Ontario Act* on users of geoscience services, and
- the commencement of enforcement and compliance activities with respect to unlicensed practice

In addition, presentations were made on on-going and/or up-and-coming issues, including professional practice and liability, continuing professional development, and strategic planning.

In October, Industrial Minerals 2004 – The Sixteenth Annual Canadian Conference on Markets for Industrial Minerals was held in Toronto. Southwest District staff participated in a number of ways. The District Geologist

attended technical sessions, provided data for a presentation by the Regional Resident Geologist, co-staffed a MNDM display entitled "Ontario Industrial Minerals", and led a pre-conference field trip. On the second day of the conference, Southwest Ontario District and MMIC staff hosted a MMIC Open House & Continental Breakfast for delegates.

The technical sessions included a number of presentations that highlighted Ontario properties and producers, or that were relevant to those exploring or developing Ontario industrial mineral resources. These presentations included:

- "Industrial Minerals in Ontario: An Update", by P. Sangster, MNDM, Tweed, Ontario
- "Lime Use In Ontario Agriculture", by R. Rell, Sylvite Agri-Services Ltd. Putnam, Ontario
- "Overcoming the Odds: Opening a New Wollastonite Mine in Ontario", by B. Vasily, Canadian Wollastonite, Seeley's Bay, Ontario
- "The Hutton Garnet Beaches, Northern Labrador"
- "Avalon's Warren Township Anorthosite Project – Developing New Markets for Feldspar", by D. Hains, Hains Technology Associates, Toronto, Ontario
- "The Market for Golf Course Sand in North America", by B. Hutcheson, Hutcheson Sand & Mixes, Huntsville, Ontario
- "Mineral Aggregate History, Trends, and Predictions, Alberta, Canada"

On October 18th, the District Geologist organized and led a Canadian Institute of Mining and Metallurgy (CIM) Toronto Branch field trip entitled "Mines and Wines – Industrial Minerals, Geology and Wineries of the Niagara Escarpment". The trip was organized by Toronto Branch of the CIM, in co-operation with Industrial Minerals Division of CIM and Industrial Minerals 2004, the Sixteenth Annual Canadian Conference on Markets for Industrial Minerals. The District Support Geologist assisted with registration and logistics.

The field trip stops included: Hanson Brick, Aldershot Quarry and Brick Plant; Walker Industries, Vineland Quarries; Lafarge Canada, Fonthill Pit.

The field trip was sold out with over 50 attendees coming from a variety of locations, including Toronto, Sudbury, Kingston, Quebec City, Ottawa, New York and Washington. Attendees represented a wide cross-section of the mineral sector and related disciplines, including industrial minerals, government, associations, exploration consultants, development and mining consultants, engineering consultants and finance groups.

The field trip was sponsored by Hanson Brick Ltd., CGC Inc, P.R. Engineering Ltd., Unimin Canada Inc., AMEC, Lafarge Canada Inc., Ministry of Northern Development and Mines, and Golder Associates, and raised almost $2300 for CIM Toronto Branch educational projects.

In November, the District Geologist presented a workshop entitled "Geoscape Toronto – A toolkit for learning about and planning for great changes in the GTA" at STAO 2004, the annual conference of the Science Teacher Association of Ontario, in Toronto. The presentation, including demonstrations of Geoscape Toronto developed lesson plans, highlighted 2 of the geoscape theme panels – the Niagara Escarpment and the Oak Ridges Moraine.

In December, at or in conjunction with the Ontario Prospectors Association Ontario Exploration and Geoscience Symposium in Toronto,

- the District Geologist presented a talk entitled "Southern Ontario Mineral Treasures - Building the Future" in cooperation with P. Sangster, the Regional Resident Geologist, Southern Ontario and R. Ernst of the Central Canadian Federation of Mineralogical Societies;
- the District Geologist presented a poster entitled "Southern Ontario Mineral Treasures - Building the Future" in cooperation with D. Laidlaw, District Support Geologist, Southeast Ontario and C. Papertzian, District Geologist, Southeast Ontario;
- the Mines and Minerals Information Centre hosted the "Discover Ontario Mineral Treasures" Open House & Continental Breakfast;

- the District Support Geologist attended a workshop on "Application of Remote Sensing to Mineral Exploration" jointly organized by MNDM and the Ontario Association of Remote Sensing (OARS). The topics presented at the workshop included, fundamentals of remote sensing, various discoveries of ore deposits around the world due to application of remote sensing techniques, use of new tools such as hyper spectral and high resolution Synthetic Aperture Radar, growth history of remote sensing, use of multi-beam radar imagery for geological mapping, and the use of Shuttle Radar Topography Mission digital elevation models for lineament mapping of Ontario.

Property Examinations and Company Contacts

Mine, quarry, property and site visits are part of the ongoing responsibilities of the Resident Geologist Program to monitor current mineral activities, document known mineral deposits and occurrences, and identify areas of high mineral potential. Site visits also provide useful information for application to land use planning processes.

In 2004, site visits conducted by Southwest Ontario District staff focused on the following 5 topic areas:

- to acquire information from mineral industry operations who produce commodities that are currently in high demand, have potential for higher demand in the near future, and/or have production or marketing issues;
- to visit prospective, proposed or developing mineral properties;
- to investigate mineral sites with current or potential land-use conflicts;
- to acquire information for subsequent field trip visits;
- to obtain information to update records contained within the Mineral Deposit Inventory (MDI) database.

There are 47 industrial mineral and dimension stone operations and approximately 40 aggregate quarries active in the Southwest Ontario District. During 2004, the District Geologist made contact with almost all industrial mineral and dimension stone producers. The District Geologist and/or District Support Geologist visited 14 quarries or mineral extraction sites, mineral processing plants, mineral distribution and/or marketing locations, development sites and prospects across the Southwest Ontario District (Table 3). In addition, the District Geologist visited 4 sites outside of the Southwest District. Site visits provided information on commodities, mineral deposits, local and regional geology, extraction techniques, processing, products, markets, production and economic statistics and issues.

Two of the site visits, which were part of the CIM October 2004 field trip – the Hanson Brick Aldershot Quarry and Brick Plant and Lafarge Canada Fonthill Pit – were highlighted in previous sections of this report.

Land Use Planning Activity

The District Geologist was involved in a number of land use planning initiatives in 2004.

At a province or large regional scale, the District Geologist participated in a number of strategic and policy initiatives including the revisions to the Provincial Policy Statements (PPS) of the Planning Act, consultations on Planning Act reform, the introduction and consultations on the "Greenbelt", and background materials for "Places to Grow" the growth management plan for the Golden Horseshoe Area. In all cases, the District Geologist was participating to ensure geological and mineral resource information was appropriately used, and to plan for current and potential future extraction of mineral resources.

District Geologist, representing MNDM, participated in the Ministry of Municipal Affairs and Housings' Planning Reform Regional Stakeholder Workshops and Town Hall Meeting/Public Information Sessions, where consultations were held on: Planning Act Reform and Implementation Tools; Provincial Policy Statement (PPS); and Ontario Municipal Board Reform.

The District Geologist attended the following meetings: Toronto Downtown Regional Stakeholder Workshop on June 15; Pickering Public Information Session on June 24; London Regional Stakeholder Workshop on July 6; and London Public Information Session on July 6. The District Geologist was participating to receive feedback on the mineral resources and aggregate resources policy statements. The PPS has been under review since 2001, including prior rounds of extensive public and interministerial consultation.

The "Greenbelt" initiative was fast tracked during 2004. The Greenbelt is a process to permanently protect a significant amount of green space and prime agricultural land across the Golden Horseshoe Area. Bill 135, the proposed Greenbelt Act, 2004, was introduced on October 28, 2004. The act is intended to give the government authority to provide "permanent protection" for a greenbelt extending 325 kilometres from the eastern end of the Oak Ridges Moraine, near Rice Lake in the east, to the Niagara River in the west, and covering some 1.8 million acres in total. In early 2004, the District Geologist input information to Greenbelt Task Force. In May, the District Geologist participated in the Greenbelt Task Force Consultations, via the Hamilton Stakeholder Workshop on May 26. Following the release of the Greenbelt draft plan in October, the District Geologist participated in 2 of the 8 sets of Greenbelt Draft Plan consultations. Each set of consultations consisted of invited Stakeholder Workshops in the afternoon, and Public Information Meetings in the evening. The sessions attended were at Ontario Science Centre on November 15, and at Caledon Community Complex on November 29. Attendance at these 2 events totaled over 70 invited stakeholders and 1200 members of the public.

Flowing from the Central Ontario Smart Growth report of 2003, the Province initiated a Growth Management Planning process in early 2004. The proposed Places to Grow Act was introduced on October 28, 2004, in order to address growth pressures in the province, particularly focusing on the Golden Horseshoe Area. This initiative is under the leadership of the Ministry of Public Infrastructure Renewal. A discussion paper entitled "Places to Grow – Better Choices, Better Future" was released in the summer of 2004. The District Geologist, in addition to other MNDM staff, provided geological and mineral resources information into the process and will continue to participate in the process.

Within the Southwest District and at a local scale, the District Geologist participated in a number and variety of land use planning initiatives in 2004. These included commenting on Official Plans and Official Plan Amendments; providing information on past gypsum mining operations in the Paris to Cayuga area; supplying information and expertise to Provincially Significant Mineral Potential (PSMP) updates; providing mineral resource evaluations and geological and other data to various municipal, provincial and private authorities; and discussing mineral exploration processes and regulations to municipal authorities and the public in areas where active exploration for zinc is occurring in southwest Ontario.

For approximately the last 4 years, and continuing through 2004, the District Geologist has provided advice in a process to further delineate and designate, for potential future extraction, shale resources in the northwest Brampton area. The District Geologist, working with staff from MMAH and MNR, is evaluating data supplied by the City of Brampton and local landowners on the quantity and quality of shale resources that should be kept available for potential future extraction.

Mineral Deposit Inventory (MDI)

In 2004, the District Support Geologist continued updating the Mineral Deposit Inventory for the Southwest Ontario District. Three new records were added, the information for 2 existing records was updated, and the principle names of 80 records were corrected. At year-end, the MDI database contained 687 records for the Southwest Ontario District.

Education Activities

In 2004, MMIC and Southwest Ontario District staff undertook a number of public education activities related to exposing those outside of the mining community to geology, mineral resources, mining, safety and land use planning issues and topics.

Geoscape Toronto is a poster, web site and curriculum-correlated student lessons providing a set of educational tools to raise awareness of the significance of earth science in the Greater Toronto Area (GTA). All elements are suitable for students, teachers, land-use planners, naturalists, and the general public. The graphics-rich poster, published by the OGS and GSC in 2003, contains informative text designed to engage and educate. It depicts the GTA's geologic past through 5 theme panels: The Niagara Escarpment; Past and Present Lakeshores; The Oak Ridges Moraine; Rivers and Valley Lands; and The Agricultural Plains. Panels outline interactions of the feature's form, resources and processes with human activities. Central to the poster is an enhanced satellite image of the GTA superimposing landscape and land-use information. The Web site www.toronto.geoscape.nrcan.gc.ca delivers ongoing and new support and reference materials, including teaching resources. To enhance the effectiveness of the poster in classrooms, curriculum-linked lessons have been designed to build on the theme panels. The lessons support Grades 7 to 9 teachers in delivering Earth Science and Geography curriculum expectations, while challenging students to relate the knowledge they have acquired to the world outside their classroom. The Geoscape Toronto project is a co-operative effort of geoscience, planning and other professionals. It has been developed through the participation and support of the government, industry, and education partners.

Staff has had significant involvement in the Geoscape Toronto project from its inception. In 2004, staff involvement included:

- K. Steele presented a paper on "Geoscape Toronto" at the Geological Association of Canada (GAC) and Mineralogical Association of Canada (MAC) annual conference, May 2004 in St. Catharines.
- K. Steele presented a workshop on "Geoscape Toronto" at Annual Conference of the Science Teachers' of Ontario, November 2004 in Toronto.
- Staff assisted with the distribution of 1500 Geoscape Toronto posters to all GTA schools teaching Grades 7 through 12, December 2004 and January 2005.
- Staff assisted with the distribution of 300 Geoscape Toronto posters to all Mayors, MPPs and MPs across the GTA, December 2004 and January 2005.
- Staff provided comments as teacher resources and curriculum-linked classroom activities were developed, finalized and posted on the Web site.

The District Geologist is an active member of the Prospectors and Developers Association of Canada (PDAC) Education Committee. This group's major project is the PDAC Mining Matters, which involves the creation, construction, distribution and on-going servicing of teaching kits designed for the grade 4 and 7 levels that illustrate the importance of minerals, rocks, metals and mining in today's society. In 2004, staff and summer students assisted with the collection and preparation of rock and mineral samples for assembling additional PDAC mining Matters teaching kits. The kits are designed to assist Ontario teachers in delivering the earth science curriculum.

The District Geologist arranged for the PDAC Mining Matters summer student staff to experience an underground gypsum mine. The mine tour at the CGC Inc. Hagersville Mine, where all mining areas are 125 cm high, provided the students with material to write an article about gypsum, wallboard manufacture, and mining in southern Ontario for the PDAC Mining Matters newsletter, which gets distributed to teachers across the Province. More information about this program is available at the Website www.pdac.ca/miningmatters.

In June, at the request of the Mining Lands Commissioner of Ontario, the District Support Geologist and Summer Experience Student - P. Landry delivered the 2 following presentations to a group of 20 Boy Scouts and Girl Guides, some of their parents and the Mining Lands Commissioner and her staff:

- "Mining in Ontario", including the history of mining, present production of metals, industrial minerals and structural materials, and future mines
- "Minerals in Ontario", including for each mineral, important properties, uses, and occurrences.

MMIC provides on-going education to students and the general public via displays, posters and hand-outs.

MMIC SERVICES

The Mines and Minerals Information Centre (MMIC) is an information, research and sales office for the Mines and Minerals Division (MMD) of the Ministry of Northern Development and Mines (MNDM). MMIC provides information, publications, data and expertise on Ontario's geology, rocks, minerals and landscape, its exploration and mining industries and the *Mining Act*.

MMIC is the gateway in Toronto for all exploration and mining inquires to the Ontario Government. Centre staff connects clients with all groups with the Ministry's Mines and Minerals Division.

The storefront information outlet serves one of the largest groupings of geoscientists, mineral industry specialists, mining and mining service companies in the world. In addition, government professionals, university and college students and staff in geoscience, engineering, architecture and land use planning use MMIC resources for research projects. In November, MMIC produced a new brochure outlining services and expertise available to clients.

In 2004, customer services were reduced at MMIC between March and May due to a project to remove asbestos from the ceiling. As of June 2004, full services resumed.

ERMES/Geoscience Databases

The Ministry of Northern Development and Mines' Earth Resources - Mineral Exploration webSite (ERMES) is an Internet-based data storage and retrieval system that contains over 200 gigabites of geoscience information. The database application site is hosted in the Ministry of Natural Resources' Land Information Ontario (LIO) system of digital information. ERMES allows users to perform Internet-based spatial (map-based) or text-based searches of geoscience information generated and collected by the Ministry of Northern Development and Mines. The MMIC has 2 designated computer terminals for clients to access ERMES, or clients may access ERMES through the MNDM web page at www.ermes.mndm.gov.on.ca.

The geoscience databases accessible on ERMES include:

- **Assessment Files Research Image (AFRI) database**: approximately 68 000 hardcopy assessment reports filed by exploration companies and prospectors since the 1940s and captured digitally, comprise the AFRI database. Reports contain geophysical, geochemical, geological, drilling, and trenching information. The purpose of this database is to assist exploration activities in Ontario by providing access to past exploration records.
- **Mineral Deposit Inventory (MDI) database**: an inventory of approximately 19 000 mineral occurrences and deposits in Ontario. Data for MDI have been collected since the early 1970s and are regularly updated.
- **Drill Hole (DH) database**: a detailed index of drill hole information in Ontario. It contains information for approximately 113 000 overburden, percussion, sonic, and diamond drill holes derived from assessment files on record with the Mines and Minerals division of MNDM.
- **Lithogeochemical (LGC) database**: a comprehensive index of lithogeochemistry information in Ontario. It contains detailed information on more than 31 500 rock samples collected and described by Ministry staff geoscientists during field projects. The database also contains mineralogical data (major and trace element concentrations) analyzed by Ministry staff at the Ministry's Geoscience Laboratory.
- **Ontario Geological Survey Publications database**: Ontario geological text and map publications have been converted to raster images and coupled with a full-text search, retrieval, and viewing system. Over 225 000 pages and 8500 Ontario Geological Survey maps have been captured in raster form.
- **Geology of Ontario maps**: 2 attributed Geology of Ontario maps are available in ERMES. The Bedrock Geology Data Set describes the distribution of the bedrock geology in Ontario, and the Quaternary Geological Data Set is a digital interpretation of the surficial geology of Ontario.

MMIC also houses 1 computer for clients who wish to access the CLAIMapsIII database. CLAIMapsIII is updated daily by the Provincial Recorder's Office (PRO) and provides information pertaining to mining claims and land tenure in Ontario. In addition, maps and digital data are available for download. CLAIMapsIII can be found on the internet at www.mndm.gov.on.ca/MNDM/MINES/lands/claimap3.

Publication Sales

MMIC houses over 10 000 Ontario geological publications available for walk-in sales. The Centre maintains a retail stock of new and old publications produced by the Ministry's Mines and Minerals Division (MMD) including:

- Geology guidebooks and posters
- Geological, geochemical, and geophysical maps and reports
- Annual statistical reports
- Industrial mineral and mineral deposit circulars
- Mineral policy background papers
- Aggregate resources maps and reports
- Open file reports

Publications and digital data can be ordered via telephone, mail, or e-mail, through the Ministry's Publication Sales Centre in Sudbury toll free at 1-888-415-9845, or electronically at pubsales@ndm.gov.on.ca.

Library Services

The MMIC library provides a selection of references and topical information on earth science and the minerals industry. Scientific journals, directories, industry periodicals, the complete collection of OGS publications dating back to 1891, and most Geological Survey of Canada (GSC) publications pertaining to Ontario are available to MMIC clients. Table 4 lists current subscriptions to geoscience and mining related newsletters. Table 5 lists the journals and periodical publications added to the Mines and Minerals Information Centre library, while Tables 6 and 7 list titles of new library publications received in 2004 from the Geological Survey of Canada and the Ontario Geological Survey, respectively. Table 8 lists all of the new reference publications the library received in 2004.

The library also compiles topical papers and articles acquired by staff at meetings or from publications to which the library does not subscribe. Reports from exploration and mining companies in Ontario are also collected and available for MMIC clients. Library holdings may be searched by an in-house computer database, while titles held at the Geoscience Library in Sudbury can be queried using an MMIC computer linked to GeoRef. Clients may request inter-library publication transfers from the Geoscience Library to the MMIC or to other Ministry offices.

Rock and Mineral Displays

The Mines and Minerals Information Centre has a comprehensive rock and mineral collection with samples on display and archived as resource material. A notable portion of the collection highlights and promotes Ontario's industrial mineral sector. Ontario diamonds, base and precious metal deposits are also represented. The walls, counter, and floor of the MMIC facility showcase the natural beauty and variation of Ontario dimension stone.

OIL, GAS AND SALT RESOURCES LIBRARY

The Oil, Gas and Salt Resources Library (OGSRL), 669 Exeter Rd., London, Ontario, is a resource centre for the study of the subsurface geology, petroleum, salt and underground hydrocarbon storage resources of Ontario.

The Library houses cutting samples from over 13 000 wells, core from nearly 1000 wells, and file information on over 20 000 wells. The files include details on well history, construction, location, stratigraphy, oil, gas, and water-

bearing intervals. Included in well records are also geophysical logs, core analyses and chemical analyses of subsurface fluid samples.

All companies that drill wells licensed under the *Oil, Gas and Salt Resources Act* are required to collect cutting samples of bedrock from the entire length of the drill hole at 3 m intervals, and deliver these samples to the Library. Any core recovered from a well is required to be submitted to the Library within one year. Well operators are required to submit copies of all reports, geophysical logs, analyses, etc., to the Ministry of Natural Resources. Copies of all reports are available at the Library for public study after the confidentiality period expires www.ogsrlibrary.com.

Although this collection is an invaluable resource to the petroleum industry, it also provides an often-overlooked tool for mineral exploration in southwestern Ontario. Examination and analysis of material on file with the OGSRL could provide an effective window into the subsurface geology of southwestern Ontario where drilling has been done. Zinc mineralization and kimberlitic intrusions are possible targets that could be identified using these data.

OGS ACTIVITIES AND RESEARCH IN SOUTHWEST ONTARIO

The Ontario Geological Survey (OGS) Sedimentary Geoscience Section conducted a number of projects or initiatives in the Southwest Ontario District in 2004. A complete summary of each project is available in Baker et al. (2004).

Two key projects for the Southwest Ontario District started in 2004. F. Brunton is leading a study of "Industrial Mineral Potential of the Guelph Formation and the Eramosa Member of the Amabel Formation, Southwestern Ontario" and D. Armstrong is the project geologist for "Southern Ontario Hydrocarbon Resource Evaluation: Regional Stratigraphic Synthesis".

In the former, the multi-year study is investigating both the industrial mineral potential of the Guelph and Amabel formations and their regional significance as bedrock aquifers in response to socio-economic pressures, including 1) increased demand for high-purity carbonates in the industrial minerals sector, 2) current and proposed limitations on future production and expansion of existing quarries of these important Silurian rock units along the Niagara Escarpment, and 3) increased demand for delineation and understanding of sustainable groundwater resources throughout southwestern Ontario. In 2004, the entire outcrop belt of the Guelph Formation and Eramosa Member was examined and over 700 samples were collected for lithological and geochemical analyses.

In the second project, the OGS has been contracted to carry out a regional stratigraphic synthesis of the Paleozoic of southern Ontario in partnership with MNR, GSC and the Ontario Oil, Gas and Salt Resources Library. Key deliverables of this project will include a comprehensive bibliography, descriptions of each stratigraphic unit and practical criteria for the identification and picking of formation contacts, descriptions of regional trends in thickness, lithology and facies, lithologic logs of reference well cuttings or cores, formation top picks based on geophysical and geological logs for each reference well, lithologic descriptions of reference outcrops, and regional cross sections. Additional project components include identification of oil- and gas-bearing intervals, and use of bedrock units for aggregates or mineral extraction. This is a one-year project and the final report is expected in the spring of 2005.

In 2004, the OGS Sedimentary Geoscience staff was involved in a number of studies in documenting and evaluating groundwater resources in southern Ontario. All studies are documented in Baker et al. (2004). Projects included:

- Three-Dimensional Mapping of Quaternary Deposits in Waterloo Region, Southwestern Ontario (A.F. Bajc)
- Sinkhole Investigation in the Ausable Bayfield Conservation Authority Watershed and Surrounding Area (D. Abbey, J. Hurley and A.G. Merry)
- Groundwater Resource Project for the Hamilton Area Watershed, Southern Ontario (P. Sarvas)
- Nutrient Management Project: Characterization of Fractured Paleozoic Bedrock in Thin Drift Areas of Southern Ontario (D.F. Russell)

- Three-Dimensional Mapping of Quaternary Deposits in the Barrie Area, Central Ontario (A.K. Burt)

RECOMMENDATIONS FOR EXPLORATION

The economic conditions of mineral commodities produced from the Southwest Ontario District has not changed significantly for the past number of years. All commodities are in strong or steady demand. Therefore, the recommendations for exploration presented in recent Reports of Activities continue to be valid. These are exploration for and investigations of:

- high-quality crushed stone aggregate for the Greater Toronto Area (GTA) market (*Report of Activities 2002* (Steele and Barua 2003))
- high-purity limestone and dolostone (*Report of Activities 2002* (Steele and Barua 2003))
- Queenston Formation shale (*Report of Activities 2002* (Steele and Barua 2003))
- Eramosa dimension and landscape stone, and Gull River limestone dimension and landscape stone (*Report of Activities 2001* (Steele and Barua 2002))
- Access to Great Lakes Markets (*Report of Activities 2000* (Steele 2001))
- Multiple Commodities (*Report of Activities 2000* (Steele 2001))
- Sylvania Formation silica sand (*Report of Activities 2000* (Steele 2001))

The selection of mineral deposits not being mined in the Southwest Ontario District presented in Table 9 are also viable exploration targets.

ACKNOWLEDGEMENTS

The authors would like to thank all mineral producers across southwest Ontario who provided access to their operations or supplied information throughout 2004. Strong communication links between stakeholder groups and government ministries is essential to effective program delivery and ultimately improves the delivery of government services. The help and co-operation of Ministry of Natural Resources staff across the district is gratefully acknowledged.

REFERENCES

Baker, C.L., Debicki, E.J., Parker, J.R., Kelly, R.I., Ayer, J.A. and Easton, R.M. 2004. Summary of Field Work and Other Activities 2004; Ontario Geological Survey, Open File Report 6145.

MNDM 2004. Ontario Mineral and Exploration Statistics 2003; Ontario Ministry of Northern Development and Mines, 56p.

Steele, K.G. 2001. Southern Ontario Regional Resident Geologist (Southwest Ontario District)–2000; *in* Report of Activities 2000, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report; Ontario Geological Survey, Open File Report 6052.

Steele, K. 2004. Mines and wines – industrial minerals, geology and wineries of the Niagara Peninsula; CIM Toronto Branch and Industrial Minerals Division, Field trip guidebook, October 18, 2004.

Steele, K.G. and Barua, M. 2002. Southern Ontario Regional Resident Geologist (Southwest Ontario District)–2001; *in* Report of Activities 2001, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report; Ontario Geological Survey, Open File Report 6084.

Steele, K.G. and Barua, M. 2003. Southern Ontario Regional Resident Geologist (Southwest Ontario District)–2002; *in* Report of Activities 2002, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report; Ontario Geological Survey, Open File Report 6115.

Table 1. Selected industrial mineral and fuel production in Ontario.

Industrial Minerals	2001 Quantity Thousands tonnes	2001 Value Thousands $	2002 Quantity Thousands tonnes	2002 Value Thousands $	2003p Quantity Thousands tonnes	2003p Value Thousands $
Non-metals						
Gypsum (1)	879	15 604	879	16 174	883	16 175
Salt (1)	8 568	270 693	7 630	262 429	8 441	267 151
Structural Materials						
Clay products (2)	y	155 061	y	191 140	y	193 377
Cement (4)	5 696	545 348	6 267	613 485	6 270	613 780
Lime (2)	1 066	96 746	1 122	103 205	1 020	103 768
Sand and Gravel (3)	97 878	390 272	95 464	405 317	94 829	410 436
Stone* (3)	58 972	505 283	55 945	504 246	53 944	506 085
Total, Industrial Minerals (Non-metals)		**2 170 770**		**2 249 939**		**2 269 115**

Fuels	Quantity Thousands $1000m^3$	Value Thousands $	Quantity Thousands $1000m^3$	Value Thousands $	Quantity Thousands $1000m^3$	Value Thousands $
Natural Gas (1)	355	77 993	425	51 105	373	112 500
Petroleum (1)	248	59 615	214	55 165	185	50 200
Total, Fuels		**137 608**		**101 305**		**162 700**

(1) all production from Southwest Ontario District
(2) 95% production from Southwest Ontario District
(3) >75% production from Southwest Ontario District
(4) >50% production from Southwest Ontario District
p preliminary data
y data not available
* production represents quarry shipments of crude or undressed stone, crushed stone and dressed stone, if the latter is prepared by the quarry operators, at values as reported by operators – this category includes crushed rock aggregate, trap rock, specialty aggregate, dimension stone and calcium carbonate
after Ontario Mineral and Exploration Statistics 2003, MNDM 2004.

Table 2. Salt and gypsum mine production and reserves in the Southwest Ontario District.

Mine	2004 Production Tonnage @ Grade	2003 Production Tonnage @ Grade	2002 Production Tonnage @ Grade	2001 Production Tonnage @ Grade	2000 Production Tonnage @ Grade	Reserves at end of 2004 Tonnage @ Grade
Caledonia No. 3 Mine (mine closed May 2004)	64 135 t @ <75% gypsum	271 376 t @ 75-80% gypsum	274 264 t @ 75-80% gypsum	272 240 t @ 75-80% gypsum	287 000 t @ 75-80% gypsum	38 565 000 t @ 70-75% gypsum
Hagersville Mine	700 000 t @ 85% gypsum	700 000 t @ 85% gypsum	690 000 t @ 85% gypsum	700 000 t @ 85% gypsum	700 000 t @ 85% gypsum	9 500 000 t @ 85% gypsum
Goderich Mine	6 270 000 t @ 97% NaCl	6 008 000 t @ 97% NaCl	5 082 000 t @ 97% NaCl	6 002 000 t @ 97% NaCl	4 200 000 t @ 97% NaCl	338 000 000 t @ 97% NaCl
Ojibway Mine	2 680 000 t @ 97% NaCl	2 712 000 t @ 97% NaCl	2 302 000 t @ 97% NaCl	2 600 000 t @ 97% NaCl	2 350 000 t @ 97% NaCl	78 900 000 t @ 97% NaCl

Table 3. Property visits conducted by the Southwest Ontario District geologists in 2004.

Property/Occurrence/Plant/Geological Site	Location	Commodity
Hilltop Stone & Supply Inc. Quarry	Esquesing Tp.	Sandstone/building stone
Owen Sound Ledgerock Ltd. – Owen Sound quarry and plant	Keppel Tp.	Marble/dolostone/dimension stone
Owen Sound Ledgerock Ltd. – Wiarton Quarry	Amabel Tp.	Marble/dolostone/dimension stone
Hanson Canada Brick - Aldershot shale quarry and brick plant	Burlington	Shale/brick
Rice & McHarg Quarries Ltd. Quarry	Esquesing Tp.	Sandstone/building stone
CGC Inc. – Hagersville Mine	Oneida Tp.	Gypsum
A & A Natural Stone Quarry	Keppel Tp.	Dolostone/building stone
Lafarge Canada Inc. – Fonthill Pit	Pelham Tp.	Sand and Gravel
Walker Industries – Vineland Quarry	Clinton Tp.	Dolostone/aggregate
The Canadian Salt Company Ltd. – Ojibway Mine	Windsor	Rock salt
The Canadian Salt Company Ltd. – Windsor Evaporation Plant	Windsor	Brine salt
JADE Hardwoods Inc. – Thedford Quarry	Bosanquet Tp.	Shale
Ted Young property	Keppel Tp.	Dolomite
Paisley Brick and Tile Plant	Paisley	Brick
OMYA Canada Inc. – Tatlock Quarry and Perth Plant	Tatlock Tp.	Calcium carbonate
Regis Resources Inc. – Canadian Vermiculite quarry and plant	Cavendish Tp.	Vermiculite
Lafarge North America – Manitoulin/Meldrum Bay Quarry	Dawson Tp.	Dolostone
Canadian Colour Rock Inc. – Silverwater Quarry	Robinson Tp.	Dolostone/building stone

Table 4. Newsletters received by MMIC library in 2004.

Title
Alaska GeoSurvey News – Newsletter, Alaska Division of Geological & Geophysical Surveys
AusGeo News – Geoscience Australia
Canadian Copper – Canadian Copper & Brass Development Association
CANQUA Newsletter – Canadian Quaternary Association
GEOLOG – News Magazine of the Geological Association of Canada
ICMM Newsletter – International Council on Mining and Metals
Mineralogical Association of Canada Newsletter
Mining Matters & Mining in Ontario – Ontario Mining Association
Nova Scotia Minerals Update – Nova Scotia Natural Resources
Ohio Geology – Ohio Department of Natural Resources
Ontario Petroleum Institute – Newsletter
PDAC in Brief – Prospectors and Developers Association of Canada
Pennsylvania Geology – Pennsylvania Department of Conservation and Natural Resources
R & D – Research and Development at the Alberta Research Council
Rock Chips – Alberta Geological Survey
Safety Focus – Mines and Aggregates Safety and Health Association
The Explorationist – Newsletter of the Ontario Prospectors Association
What on Earth – University of Waterloo Department of Earth Sciences

Table 5. Journals and periodicals received by MMIC library in 2004.

Title
Aggregates & Roadbuilding
American Association of Petroleum Geologists (AAPG) Bulletin
Canadian Journal of Earth Sciences
Canadian Geotechnical Journal
Canadian Mining Journal
Canadian Mining and Metallurgical Bulletin – Canadian Institute of Mining, Metallurgy and Petroleum
Economic Geology – Bulletin of the Society of Economic Geologists
Engineering and Mining Journal
Géographie Physique et Quaternaire
Geoscience Canada
Industrial Minerals
Mining Engineering
Northern Miner
On Nature – Ontario Nature Magazine of the Federation of Ontario Naturalists
Pit & Quarry
Stone World
The Canadian Mineralogist – Mineralogical Association of Canada
The Ontario Prospector

Table 6. Selected Geological Survey of Canada publications incorporated into the MMIC library during 2004. (Publications of particular interest to Southwest Ontario District are shown in bold.)

Title	Author	Type and Year of Publication
Geology, Alteration and Mineralization of the Onaping Formation, Morgan Township, Sudbury Structure, Ontario	Ames, D.E. and Gibson, H.L.	Open File 3717, 2 sheets, 2004
Transport and Attenuation of Arsenic, Cobalt and Nickel in an Alkaline Environment (Cobalt, Ontario)	Percival, J.B., Kwong, Y.T.J., Dumaresq, C.G. and Michel, F.A.	Open File 1680, 1 CD-ROM, 2004
Geology and Tectonostratigraphic Assemblages Western Wabigoon Subprovince Ontario	Sanborn-Barrie, M., Skulski, T., Percival, J.A., Whalen, J.B., Brown, J.L. and McNicoll, V.	Open File 4255, 1 CD-ROM, 2004
Geology and Tectonostratigraphic Assemblages North Central Wabigoon Subprovince Ontario	Percival, J.A., Whalen, J.B., Tomlinson, K.Y., McNicoll, V. and Stott, G.M.	Open File 4270, 1 CD-ROM, 2004
Pontypool 'Golden Spike' Borehole Digital Data Compilation: Sedimentological and Geophysical Data	**Russell, H.A.J., Sharpe, D.R. and Hunter, J.**	**Open File 4540, 1 CD-ROM, 2004**
Principal Mineral Areas of Canada	Minerals and Metals Sector and National Energy Board	Map 900A, Fifty-third Edition, scale 1:6 000 000, 2003
Principales Régions Minières du Canada	Secteur des Minéraux et des Métaux et Office National de l'Énergie	Carte 900A, Cinquante-troisième Édition, échelle 1/6 000 000, 2003
Geology and Tectonostratigraphic Assemblages, East Uchi Subprovince, Red Lake and Birch–Uchi Belts, Ontario	Sanborn-Barrie, M., Rogers, N., Skulski, T., Parker, J., McNicoll, V. and Devaney, J.	Open File 4256, 1 CD-ROM / 1 Sheet, scale 1:250 000, 2004
Geology, Tectonometamorphic Map of Ontario, Canada and Parts of the United States of America	Easton, R.M. and Berman, R.G.	Open File 1810, 1 Sheet, scale 1:1 500 000, 2004

Title	Author	Type and Year of Publication
Airborne Gamma Ray Spectrometry Compilation, Natural Air Absorbed Dose Rate, Central Metasedimentary Belt, (Grenville Province), Ontario-Québec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4557, 1 Sheet, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, Potassium, Central Metasedimentary Belt, (Grenville Province), Ontario-Québec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4558, 1 Sheet, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, Equivalent Uranium, Central Metasedimentary Belt, (Grenville Province), Ontario-Québec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4559, 1 Sheet, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, Equivalent Thorium, Central Metasedimentary Belt, (Grenville Province), Ontario-Québec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4560, 1 Sheet, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, eU/eTh Ratio, Central Metasedimentary Belt, (Grenville Province), Ontario-Québec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4561, 1 Sheet, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, eU/K Ratio, Central Metasedimentary Belt, (Grenville Province), Ontario-Québec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4562, 1 Sheet, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, eTh/K Ratio, Central Metasedimentary Belt, (Grenville Province), Ontario-Québec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4563, 1 Sheet, scale 1:250 000, 2004
Airborne Gamma Ray Spectrometry Compilation, Ternary Radioelement Map, Central Metasedimentary Belt, (Grenville Province), Ontario-Québec	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4564, 1 Sheet, scale 1:250 000, 2004
Geology, Alteration and Mineralization of the Onaping Formation, Rockcut Lake Area, Norman Township, Sudbury Structure, Ontario	Ames, D.E. and Gibson, H.L.	Open File 4565, 1 Sheet, scale 1:2000, 2004
Geology, Alteration and Mineralization of the Onaping Formation, Joe Lake Area, Wisner Township, Sudbury Structure, Ontario	Ames, D.E. and Gibson, H.L.	Open File 4566, 1 Sheet, scale 1:2000, 2004
Geology, Alteration and Mineralization of the Onaping Formation, Simmons Lake Area, Dowling Township, Sudbury Structure, Ontario	Ames, D.E. and Gibson, H.L.	Open File 4567, 1 Sheet, scale 1:2000, 2004
Geology, Alteration and Mineralization of the Onaping Formation, Cow Lake Area, Dowling Township, Sudbury Structure, Ontario	Ames, D.E. and Gibson, H.L.	Open File 4568, 2 Sheets, scale 1:2000, 2004
Geoscape Ottawa-Gatineau	Aylsworth, J.M.	Miscellaneous Report 85, Colour Poster, 2004
Géopanorama Ottawa-Gatineau	Aylsworth, J.M.	Miscellaneous Report 85, Colour Poster, 2004
Current Research 2003, Version 2	Geological Survey of Canada	Current Research, Version 2, 1 CD-ROM, 2004
Distribution, Thickness and Three-dimensional Geometry of Salt Deposits in Southwestern Ontario	**Sanford, B.V.**	**Open File 401, 11 Sheets, 1977**
Airborne Gamma Ray Spectrometry Compilation, Natural Air Absorbed Dose Rate, Ontario, Ontario	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4549, 1 Sheet, scale 1:2 000 000, 2004

Title	Author	Type and Year of Publication
Airborne Gamma Ray Spectrometry Compilation, Potassium, Ontario, Ontario	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4550, 1 Sheet, scale 1:2 000 000, 2004
Airborne Gamma Ray Spectrometry Compilation, Equivalent Uranium,Ontario, Ontario	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4551, 1 Sheet, scale 1:2 000 000, 2004
Airborne Gamma Ray Spectrometry Compilation, Equivalent Thorium, Ontario, Ontario	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4552, 1 Sheet, scale 1:2 000 000, 2004
Airborne Gamma Ray Spectrometry Compilation, eU/eTh Ratio, Ontario, Ontario	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4553, 1 Sheet, scale 1:2 000 000, 2004
Airborne Gamma Ray Spectrometry Compilation, eU/K Ratio, Ontario, Ontario	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4554, 1 Sheet, scale 1:2 000 000, 2004
Airborne Gamma Ray Spectrometry Compilation, eTh/K Ratio, Ontario, Ontario	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4555, 1 Sheet, scale 1:2 000 000, 2004
Airborne Gamma Ray Spectrometry Compilation, Ternary Radioelement Map, Ontario, Ontario	Carson, J.M., Holman, P.B., Ford, K.L., Grant, J.A. and Shives, R.B.K.	Open File 4556, 1 Sheet, scale 1:2 000 000, 2004
Geology, Bee Lake Greenstone Belt, Ontario–Manitoba	Rogers, N.	Open File 4315, 1 CD-ROM, scale 1:50 000, 2004
Structural Geology, Savant Lake Greenstone Belt, Western Superior Province, Ontario	Sanborn-Barrie, M.	Open File 3947, 1 CD-ROM, scale 1:100 000, 2004
Geology, Confederation Lake, Ontario	Rogers, N.	Open File 4265, 1 CD-ROM, scale 1:50 000, 2004
Geology of the Onaping Formation: Dowling, Morgan, Levack, and Balfour Townships, Sudbury, Ontario	Gibbins, S., Ames, D.E. and Gibson, H.L.	Open File 4569, 1 Colour Map, scale 1:10 000, 2004
Kimberlite Indicator Mineral Chemistry and Till Geochemistry around the Seed and Triple B Kimberlites, Lake Timiskaming, Ontario	McClenaghan, M.B., Kjarsgaard, I.M. and Kjarsgaard, B.A.	Open File 4822, 1 CD-ROM, 2004
Geology and Tectonostratigraphic Assemblages, Eastern Sachigo Subprovince, Ontario and Manitoba	Stone, D., Corkery, M.T., Hallé, J., Ketchum, J., Lange, M., Skulski, T. and Whalen, J.	Open File 1582, 1 Sheet, scale 1:250 000, 2004

Table 7. Selected Ontario Geological Survey publications received by MMIC library in 2004. (Publications of particular interest to Southwest Ontario District are shown in bold.)

Title	Author	Type and Year of Publication
Regional Modern Alluvium Sampling Survey of the Cobalt–Elk Lake Area, Northeastern Ontario	Reid, J.L.	Ontario Geological Survey, Open File Report 6119†, 140p., 2004
Modern Alluvium Data Release, Cobalt–Elk Lake Area, Northeastern Ontario	Reid, J.L.	Ontario Geological Survey, Miscellaneous Release–Data 124, 1 CD-ROM, 2004
Sturgeon Lake–Wabigoon Lake Area High Density Regional Lake Sediment and Water Geochemical Survey, Northwestern Ontario	Russell, D.F.	Ontario Geological Survey, Open File Report 6125†, 94p., 2004
Sudbury Area Lake Sediment Geochemical Survey	Dyer, R.D., Takats, P.A. and Felix, V.E.	Ontario Geological Survey, Open File Report 6126†, 106p., 2004
Lake Sediment and Water Data for the Sturgeon Lake–Wabigoon Lake Area	Russell, D.F.	Ontario Geological Survey, Miscellaneous Release–Data 130, 1 CD-ROM, 2004

Title	Author	Type and Year of Publication
Lake Sediment and Water Quality Data from the Sudbury Area, Northeastern Ontario	Dyer, R.D.	Ontario Geological Survey, Miscellaneous Release–Data 131, 1 CD-ROM, 2004
Precambrian Geology, Otto and Eby Townships	Pigeon, L. and Berger, B.R.	Ontario Geological Survey, Preliminary Map P.3534, scale 1:20 000, 2004
Precambrian Geology of the South Armstrong–Gull Bay Area, Nipigon Embayment, Northwestern Ontario	MacDonald, C.A.	Ontario Geological Survey, Open File Report 6136†, 42p., 2004. Accompanied by Map P.3536 and P.3537
Precambrian Geology of the Waweig–Wabinosh Lakes Area, Western Nipigon Embayment, Northwestern Ontario	MacDonald, C.A., terMeer, M., Lepage, L., Préfontaine, S. and Tremblay, E.	Ontario Geological Survey, Preliminary Map P.3536, scale 1:50 000, 2004
Precambrian Geology of the English Bay–Havoc Lake Area, Western Nipigon Embayment, Northwestern Ontario	MacDonald, C.A., terMeer, M., Lepage, L., Préfontaine, S. and Tremblay, E.	Ontario Geological Survey, Preliminary Map P.3537, scale 1:50 000, 2004
Petrography, Chemistry and Diamond Characteristics of Heterolithic Breccia and Lamprophyre Dikes at Wawa, Ontario	Stone, D. and Semenyna, L.	Ontario Geological Survey, Open File Report 6134, 39p., 2004
Geological Guidebook to the Paleoproterozoic East Bull Lake Intrusive Suite Plutons at East Bull Lake, Agnew Lake and River Valley, Ontario	Easton, R.M., Jobin-Bevans, L.S. and James, R.S.	Ontario Geological Survey, Open File Report 6135, 84p., 2004
Precambrian Geology of the Northern Black Sturgeon River and Disraeli Lake Area, Nipigon Embayment, Northwestern Ontario	Hart, T.R. and Magyarosi, Z.	Ontario Geological Survey, Open File Report 6138†, 56p., 2004. Accompanied by Map P.3538, P.3539 and P.3540
Geology and Tectonostratigraphic Assemblages, East Uchi Subprovince, Red Lake and Birch–Uchi Belts, Ontario	Sanborn-Barrie, M., Rogers, N., Skulski, T., Parker, J., McNicoll, V. and Devaney, J.	Ontario Geological Survey, Preliminary Map P.3460, scale 1:250 000, 2004
Geology, Tectonometamorphic Map of Ontario, Canada and Parts of the United States of America	Easton, R.M. and Berman, R.G.	Ontario Geological Survey, Preliminary Map P.3533, scale 1:500 000, 2004
Precambrian Geology, Henry and Loughrin Townships	Easton, R.M. and terMeer, M.	Ontario Geological Survey, Preliminary Map P.3535, scale 1:20 000, 2004
Precambrian Geology of the Northern Black Sturgeon River Area, Nipigon Embayment, Northwestern Ontario	Hart, T.R. and Préfontaine, S.	Ontario Geological Survey, Preliminary Map P.3538, scale 1:50 000, 2004
Precambrian Geology of the Disraeli Lake Area, Nipigon Embayment, Northwestern Ontario	Hart, T.R. and Préfontaine, S.	Ontario Geological Survey, Preliminary Map P.3539, scale 1:50 000, 2004
Northern Black Sturgeon River Area Geological Cross-Sections, Nipigon Embayment, Northwestern Ontario	Magyarosi, Z., Hart, T.R., Fralick, P., Metsaranta, R., Heggie, G.J., Hollings, P. and Richardson, A.	Ontario Geological Survey, Preliminary Map P.3540, scale 1:50 000, 2004
Precambrian Geology, Shaw Township	Hall, L.A.F., Houlé, M.G. and Tremblay, E.	Ontario Geological Survey, Preliminary Map P.3541, scale 1:20 000, 2004
Precambrian Geology, Eldorado and Adams Townships	Houlé, M.G., Hall, L.A.F., and Tremblay, E.	Ontario Geological Survey, Preliminary Map P.3542, scale 1:20 000, 2004
Lithofacies and Geochemistry of the Lucas Formation in the Subsurface of Southwestern Ontario: A High-Purity Limestone and Potential High-Purity Dolostone Resource	**Birchard, M.C., Rutka, M.A. and Brunton, F.R.**	**Ontario Geological Survey, Open File Report 6137, 180p., 2004**
Report of Activities 2003, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts	Lichtblau, A., Hinz, P., Ravnaas, C., Storey, C.C., Kosloski, L., and Raoul, A.	Ontario Geological Survey, Open File Report 6127, 104p., 2004
Report of Activities 2003, Resident Geologist Program, Thunder Bay North Regional Resident Geologist Report: Thunder Bay North District	Smyk, M.C., White, G.D., Magee, M.A. and Komar, C.	Ontario Geological Survey, Open File Report 6128, 42p., 2004
Report of Activities 2003, Resident Geologist Program, Thunder Bay South Regional Resident Geologist Report: Thunder Bay South District	Schnieders, B.R., Scott, J.F., O'Brien, M.S., Magee, M.A. and Komar, C.	Ontario Geological Survey, Open File Report 6129, 39p., 2004

Title	Author	Type and Year of Publication
Report of Activities 2003, Resident Geologist Program, Timmins Regional Resident Geologist Report: Timmins and Sault Ste. Marie Districts	Atkinson, B.T., Hailstone, M., Seim, G.Wm., Wilson, A.C., Draper, D.M., Butorac, S. and Cooper, G.R.	Ontario Geological Survey, Open File Report 6130, 87p., 2004
Report of Activities 2003, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake District	Meyer, G., Grabowski, G.P.B., Gumdon, D.L. and Chaloux, E.C.	Ontario Geological Survey, Open File Report 6131, 52p., 2004
Report of Activities 2003, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre and Petroleum Resources Centre	**Sangster, P.J., Farrow, D., Papertzian, V.C., Lee, C., Barua, M., Laidlaw, D.A., Hemmings, D. and Carter, T.R.**	**Ontario Geological Survey, Open File Report 6132, 83p., 2004**
Report of Activities 2003, Resident Geologist Program, Regional Land Use Geologist Report: Northwestern, Northeastern and Southern Ontario Regions	**Debicki, R.L., Drost, A.P., Fraser, R.J., Rowell, D.J. and Yule, G.R.**	**Ontario Geological Survey, Open File Report 6133, 35p., 2004**
Airborne Magnetic and Gamma-Ray Spectrometric Surveys, Residual Magnetic Field and Keating Coefficients, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 812 - 81 823, scale 1:50 000, 2004
Airborne Magnetic and Gamma-Ray Spectrometric Surveys, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 824 - 81 835, scale 1:50 000, 2004
Airborne Magnetic and Gamma-Ray Spectrometric Surveys, Ternary Radioelement Image, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 836 – 81 847, scale 1:50 000, 2004
Airborne Magnetic and Gamma-Ray Spectrometric Surveys, Residual Magnetic Field and Keating Coefficients, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 848 – 81 849, scale 1:100 000, 2004
Airborne Magnetic and Gamma-Ray Spectrometric Surveys, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 850 – 81 851, scale 1:100 000, 2004
Airborne Magnetic and Gamma-Ray Spectrometric Surveys, Ternary Radioelement Image, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 852 - 81 853, scale 1:100 000, 2004
Airborne Magnetic and Electromagnetic Surveys, Residual Magnetic Field and Electromagnetic Anomalies, Shaw Dome Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 854 - 81 856, scale 1:20 000, 2004
Airborne Magnetic and Electromagnetic Surveys, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Shaw Dome Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 857 - 81 859, scale 1:20 000, 2004
Airborne Magnetic and Electromagnetic Surveys, Apparent Resistivity and Electromagnetic Anomalies, Shaw Dome Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 860 - 81 862, scale 1:20 000, 2004
Report of Activities 2003, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Sudbury District	Cosec, M., Gaudreau, J.M., Selway, J.B. and Beauchamp, S.A.	Ontario Geological Survey, Open File Report 6139, 33p., 2004

Title	Author	Type and Year of Publication
Geological and Lithogeochemical Data from the Northwest Nipigon Embayment, Lake Nipigon Region Geoscience Initiative (LNRGI)	MacDonald, C.A. and Tremblay, E.	Ontario Geological Survey, Miscellaneous Release–Data 132, 1 CD-ROM, 2004
Northern Black Sturgeon River–Disraeli Lake Area, Nipigon Embayment, Northwestern Ontario: Lithogeochemical, Assay and Compilation Data	Hart, T.R. and Magyarosi, Z.	Ontario Geological Survey, Miscellaneous Release–Data 133, 1 CD-ROM, 2004
Detectability of Mineral Deposits with Airborne Gravity Gradiometry (v.1 & v.2)	OGS and Mira Geoscience Limited	Ontario Geological Survey, Miscellaneous Release–Data 134, 2 CD-ROMs, 2004
Magnetic and Electromagnetic Data, Grid and Profile Data (ASCII and Geosoft® Formats) and Vector Data, Reid–Mahaffy Test Area MEGATEM® II Survey	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Geophysical Data Set 1045, 1 CD-ROM, 2004
Magnetic and Electromagnetic Data, Grid and Profile Data (ASCII Format) and Vector Data, Shaw Dome Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1046a, 1 CD-ROM, 2004
Magnetic and Electromagnetic Data, Grid and Profile Data (Geosoft® Format) and Vector Data, Shaw Dome Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1046b, 1 CD-ROM, 2004
Magnetic and Gamma-Ray Spectrometric Data, Grid Data (ASCII Format) and Vector Data, Lake Nipigon Embayment Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1047a, 2 CD-ROMs, 2004
Magnetic and Gamma-Ray Spectrometric Data, Grid Data (Geosoft® Format) and Vector Data, Lake Nipigon Embayment Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1047b, 2 CD-ROMs, 2004
Magnetic and Gamma-Ray Spectrometric Data, Profile Data (ASCII Format), Lake Nipigon Embayment Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1047c, 2 CD-ROMs, 2004
Magnetic and Gamma-Ray Spectrometric Data, Profile Data (Geosoft® Format), Lake Nipigon Embayment Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1047d, 4 CD-ROMs, 2004
Airborne Magnetic Survey, Residual Magnetic Field and Keating Coefficients, Round Lake Batholith Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 863 - 81 875, scale 1:20 000, 2004
Airborne Magnetic Survey, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Round Lake Batholith Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 884 - 81 896, scale 1:20 000, 2004
Airborne Magnetic Survey, Colour-filled Contours of the Residual Magnetic Field and Keating Coefficients, Round Lake Batholith Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 876 - 81 879, scale 1:50 000, 2004
Airborne Magnetic Survey, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Round Lake Batholith Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 880 - 81 883, scale 1:50 000, 2004
Magnetic Data, Grid Data (ASCII Format) and Vector Data, Round Lake Batholith Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1048a, 1 CD-ROM, 2004
Magnetic Data, Grid Data (Geosoft® Format) and Vector Data, Round Lake Batholith Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1048b, 1 CD-ROM, 2004
Magnetic Data, Profile Data (ASCII Format), Round Lake Batholith Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1048c, 1 CD-ROM, 2004
Magnetic Data, Profile Data (Geosoft® Format), Round Lake Batholith Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1047d, 4 CD-ROMs, 2004
Precambrian Geology of Ben Nevis and Katrine Townships	Péloquin, A.S.	Ontario Geological Survey, Preliminary Map P.3543, scale 1:20 000, 2004
Precambrian Geology, Parts of Godfrey, Turnbull, Carscallen and Bristol Townships	Hathway, B. and Hocker, S.M.	Ontario Geological Survey, Preliminary Map P.3544, scale 1:10 000, 2004

Title	Author	Type and Year of Publication
Precambrian Geology of Gauthier Township Transect	Ispolatov, V.O. and Lafrance, B.	Ontario Geological Survey, Preliminary Map P.3546, scale 1:10 000, 2004
Precambrian Geology, Whitney and Hoyle Townships	Bateman, R.	Ontario Geological Survey, Preliminary Map P.3547, scale 1:10 000, 2004
A Comparison of Selective Leach Signatures Over Kimberlites and Other Targets	Burt, A.K. and Hamilton, S.M.	Ontario Geological Survey, Open File Report 6142†, 179p., 2004
Airborne Magnetic Survey, Residual Magnetic Field and Keating Coefficients, Porcupine Destor-Pipestone Faults Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 897 - 81 900, scale 1:20 000, 2004
Airborne Magnetic Survey, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Porcupine Destor-Pipestone Faults Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 901 - 81 904, scale 1:20 000, 2004
Airborne Magnetic Survey, Colour-filled Contours of the Residual Magnetic Field and Keating Coefficients, Porcupine Destor-Pipestone Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 905, scale 1:50 000, 2004
Airborne Magnetic Survey, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Porcupine Destor-Pipestone Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 906, scale 1:50 000, 2004
Magnetic Data, Grid Data (ASCII Format) and Vector Data, Central Abitibi Destor-Porcupine–Pipestone Faults Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1049a, 1 CD-ROM, 2004
Magnetic Data, Grid Data (Geosoft® Format) and Vector Data, Central Abitibi Destor-Porcupine–Pipestone Faults Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1049b, 1 CD-ROM, 2004
Magnetic Data, Profile Data (ASCII Format), Central Abitibi Destor-Porcupine–Pipestone Faults Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1049c, 2 CD-ROMs, 2004
Magnetic Data, Profile Data (Geosoft® Format), Central Abitibi Destor-Porcupine–Pipestone Faults Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1049d, 2 CD-ROMs, 2004
Ground Gravity Survey, Terrain-corrected Bouguer Anomaly, Southern Part, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 930, scale 1:100 000, 2004
Ground Gravity Survey, Terrain-corrected Bouguer Anomaly, Northern Part, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 931, scale 1:100 000, 2004
Ground Gravity Survey, First Vertical Derivative of the Terrain-corrected Bouguer Anomaly, Southern Part, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 932, scale 1:100 000, 2004
Ground Gravity Survey, First Vertical Derivative of the Terrain-corrected Bouguer Anomaly, Northern Part, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 933, scale 1:100 000, 2004
Ground Gravity Survey, Residual of the Terrain-corrected Bouguer Anomaly, Southern Part, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 934, scale 1:100 000, 2004
Ground Gravity Survey, Residual of the Terrain-corrected Bouguer Anomaly, Northern Part, Lake Nipigon Embayment Area	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 935, scale 1:100 000, 2004
Gravity Data, Grid and Point Data (ASCII and Geosoft® Formats) and Vector Data, Lake Nipigon Embayment Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1052, 1 CD-ROM, 2004
Airborne Magnetic Survey, Residual Magnetic Field and Keating Coefficients, Lake Abitibi Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 907 - 81 912, scale 1:20 000, 2004

Title	Author	Type and Year of Publication
Airborne Magnetic Survey, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Lake Abitibi Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 913 - 81 918, scale 1:20 000, 2004
Airborne Magnetic Survey, Colour-filled Contours of the Residual Magnetic Field and Keating Coefficients, Lake Abitibi Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 919, scale 1:50 000, 2004
Airborne Magnetic Survey, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Lake Abitibi Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 920, scale 1:50 000, 2004
Magnetic Data, Grid Data (ASCII Format) and Vector Data, Lake Abitibi Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1050a, 1 CD-ROM, 2004
Magnetic Data, Grid Data (Geosoft® Format) and Vector Data, Lake Abitibi Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1050b, 1 CD-ROM, 2004
Magnetic Data, Profile Data (ASCII Format), Lake Abitibi Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1050c, 1 CD-ROM, 2004
Magnetic Data, Profile Data (Geosoft® Format), Lake Abitibi Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1050d, 2 CD-ROMs, 2004
Airborne Gravity Survey, Terrain-corrected Bouguer Gravity and Flight Paths, Northwest Timmins Area: Groundhog River to Frederick House River	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 921, scale 1:100 000, 2004
Airborne Gravity Survey, Terrain-corrected Bouguer Gravity and Flight Paths, Northeast Timmins Area: Highway 101 Corridor	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 922, scale 1:100 000, 2004
Airborne Gravity Survey, Terrain-corrected Bouguer Gravity and Flight Paths, South Timmins Area: Peterlong Lake to Whitefish River	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 923, scale 1:100 000, 2004
Airborne Gravity Survey, First Vertical Derivative of the Terrain-corrected Bouguer Gravity, Northwest Timmins Area: Groundhog River to Frederick House River	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 924, scale 1:100 000, 2004
Airborne Gravity Survey, First Vertical Derivative of the Terrain-corrected Bouguer Gravity, Northeast Timmins Area: Highway 101 Corridor	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 925, scale 1:100 000, 2004
Airborne Gravity Survey, First Vertical Derivative of the Terrain-corrected Bouguer Gravity, South Timmins Area: Peterlong Lake to Whitefish River	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 926, scale 1:100 000, 2004
Airborne Gravity Survey, Shaded Digital Elevation, Northwest Timmins Area: Groundhog River to Frederick House River	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 927, scale 1:100 000, 2004
Airborne Gravity Survey, Shaded Digital Elevation, Northeast Timmins Area: Highway 101 Corridor	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 928, scale 1:100 000, 2004
Airborne Gravity Survey, Shaded Digital Elevation, South Timmins Area: Peterlong Lake to Whitefish River	OGS / Lake Nipigon Region Geoscience Initiative	Ontario Geological Survey, Map 81 929, scale 1:100 000, 2004
Precambrian Geology, Armistice Lake Area	Stone, D., Fell, M. and Daley, A.	Ontario Geological Survey, Preliminary Map P.3553, scale 1:50 000, 2004
Precambrian Geology of the Burt–Holmes Area	Berger, B.R.	Ontario Geological Survey, Preliminary Map P.3554, scale 1:20 000, 2004
Temagami Area Lake Sediment Geochemical Survey, Northeastern Ontario	Takats, P.A. amd Dyer, R.D.	Ontario Geological Survey, Open File Report 6144†, 113p., 2004
Mineral Deposit Inventory Version 2 (MDI2)–October 2004 Release	**Ontario Geological Survey**	**Ontario Geological Survey, MDI2–October 2004 Release, 1 CD-ROM, 2004**

Title	Author	Type and Year of Publication
Gravity Data, Grid and Profile Data (ASCII Format) and Vector Data, Northeast, Northwest and South Timmins Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1051a, 1 CD-ROM, 2004
Gravity Data, Grid and Profile Data (Geosoft® Format) and Vector Data, Northeast, Northwest and South Timmins Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1051b, 1 CD-ROM, 2004
Lake Sediment and Water Quality Data for the Temagami Area, Northeastern Ontario	Takats, P.A. and Dyer, R.D.	Ontario Geological Survey, Miscellaneous Release—Data 137, 1 CD-ROM, 2004
Demonstration Surveys of the Distributed Acquisition (MT/IP) Method Earth Imaging Technology	OGS / Quantec Geoscience Limited	Ontario Geological Survey, Miscellaneous Release–Data 139, 3 CD-ROMs, 2004
Airborne Magnetic Survey, Residual Magnetic Field and Keating Coefficients, Kirkland Lake – Larder Lake Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 936 - 81 941, scale 1:20 000, 2004
Airborne Magnetic Survey, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Kirkland Lake – Larder Lake Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 942 - 81 947, scale 1:20 000, 2004
Airborne Magnetic Survey, Colour-filled Contours of the Residual Magnetic Field and Keating Coefficients, Kirkland Lake – Larder Lake Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 948 – 81 949, scale 1:50 000, 2004
Airborne Magnetic Survey, Shaded Image of the Second Vertical Derivative of the Magnetic Field and Keating Coefficients, Kirkland Lake – Larder Lake Area	OGS / Discover Abitibi Initiative	Ontario Geological Survey, Map 81 950 – 81 951, scale 1:50 000, 2004
Georgian Bay Geological Synthesis, Grenville Province: Explanatory Notes for Preliminary Maps P.3548 to P.3552	Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wodicka, N. and Easton, R.M.	Ontario Geological Survey, Open File Report 6143, 28p., 2004
Geology and Tectonostratigraphic Assemblages, Eastern Sachigo Subprovince, Ontario and Manitoba	Stone, D., Corkery, M.T., Hallé, J., Ketchum, J., Lange, M., Skulski, T. and Whalen, J.	Ontario Geological Survey, Preliminary Map P.3462, scale 1:250 000, 2004
Precambrian Geology, Key Harbour Area	Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wallace, P. and Wodicka, N.	Ontario Geological Survey, Preliminary Map P.3548, scale 1:50 000, 2004
Precambrian Geology, Naiscoot Area	Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wallace, P. and Wodicka, N.	Ontario Geological Survey, Preliminary Map P.3549, scale 1:50 000, 2004
Precambrian Geology, Parry Sound Area	Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wallace, P. and Wodicka, N.	Ontario Geological Survey, Preliminary Map P.3550, scale 1:50 000, 2004
Precambrian Geology, Sans Souci Area	Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wallace, P. and Wodicka, N.	Ontario Geological Survey, Preliminary Map P.3551, scale 1:50 000, 2004
Precambrian Geology, Penetanguishene Area	Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wallace, P. and Wodicka, N.	Ontario Geological Survey, Preliminary Map P.3552, scale 1:50 000, 2004
Aggregate Resources Inventory of Huron County	**Ontario Geological Survey**	**ARIP 177, 78p., 2004. Accompanied by 7 maps* ARIMs 177-1A, -1B, -1C, -1D, -2A, -2B, -2C**
Summary of Field Work and Other Activities 2004	**Baker, C.L., Debicki, E.J., Parker, J.R., Kelly, R.I., Ayer, J.A. and Easton, R.M.**	**Ontario Geological Survey, Open File Report 6145, 479p., 2004**
Magnetic Data, Grid Data (ASCII Format) and Vector Data, Kirkland Lake - Larder Lake Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1053a, 1 CD-ROM, 2004
Magnetic Data, Grid Data (Geosoft® Format) and Vector Data, Kirkland Lake - Larder Lake Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1053b, 1 CD-ROM, 2004
Magnetic Data, Profile Data (ASCII Format), Kirkland Lake - Larder Lake Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1053c, 1 CD-ROM, 2004
Magnetic Data, Profile Data (Geosoft® Format), Kirkland Lake - Larder Lake Area	Ontario Geological Survey	Ontario Geological Survey, Geophysical Data Set 1053d, 2 CD-ROMs, 2004
Lake Nipigon Region Geoscience Initiative (LNRGI) Lineament Analysis	Barnett, P.J. and Shirota, J.	Ontario Geological Survey, Miscellaneous Release–Data 140, 1 CD-ROM, 2004

Title	Author	Type and Year of Publication
Petrographic Data from the Northwest Nipigon Embayment, Lake Nipigon Region Geoscience Initiative (LNRGI)	Schandl, E.S.	Ontario Geological Survey, Miscellaneous Release–Data 141, 1 CD-ROM, 2004
Lineament Extraction from Digital Elevation Model (DEM) for the Province of Ontario	Shirota, J. and Barnett, P.J.	Ontario Geological Survey, Miscellaneous Release–Data 142, 1 CD-ROM, 2004
Geological Compilation of the Abitibi Greenstone Belt	Ayer, J.A., Trowell, N.F. and Josey, S.	Ontario Geological Survey, Miscellaneous Release–Data 143, 2 CD-ROMs, 2004
Aggregate Resources Inventory Maps of Huron County: Northern, Northeastern, Central and Southern Sheets	**Ontario Geological Survey**	**ARIMs 177-1A, -2A, -1B, -2B, -1C, -2C, -1D, 1 CD-ROM, 2004**

* *Also released in digital form.*
† *Geochemical data / chemical analyses / appendices available in digital form.*

Table 8. Selected new reference publications received by the MMIC library in 2004. (Publications of particular interest to Southwest Ontario District are shown in bold.)

Title	Author	Type and Year of Publication
Ontario Mining and Exploration Directory 2004	Viegas-Monchamp, T. (ed.)	Directory, Naylor Publications Company (Canada), Winnipeg Manitoba, 50p., 2004
Geoscience Reporting Guidelines	Grant, B.	Geoscience Reporting Guidelines, Victoria, BC, Canada, 346p., 2003
Breaking New Ground: Mining, Minerals, and Sustainable Development	International Institute for Environment and Development (IIED)	Report of the MMSD Project, Earthscan Publications Ltd
Platinum 2004	Kendall, T.	Platinum Report, Johnson Matthey Public Limited Company, London England, 56p., 2004
Platinum 2004 Interim Review	Kendall, T.	Platinum Report, Johnson Matthey Public Limited Company, London England, 28p., 2004
Toronto Rocks: The Geological Legacy of the Toronto Region	**Eyles, N.**	**Second Edition, Fitzhenry & Whiteside, Markham Ontario, 48p., 2004**
Proud Heritage: People and Progress in Early Canadian Geoscience	Macqueen, R.W. (ed.)	Geological Association of Canada, Geoscience Canada Reprint Series 8, St. John's Newfoundland, 217p., 2004
Greenbelt: Draft Plan 2004	**Ministry of Municipal Affairs and Housing**	**Ontario Greenbelt, Queen's Printer for Ontario, Toronto, 34p., 2004**
Canadian & American Mines Handbook 2004-2005	Giancola, D. (ed.)	Business Information Group, Toronto, 600p., 2004
2004/05 CAMESE Compendium of Canadian Mining Suppliers	Baird, J.G., Director	The Canadian Association of Mining Equipment and Services for Export, Markham Ontario, 162p., 2004
Ontario Dimension Stone Producers and Processors	**MNDM – Mines and Minerals Division**	**Directory, Mines and Minerals Division, Sudbury, 1 v., 2004**
Geoscape Edmonton	Edwards, D., Magee, D., Langenberg, W., Grobe, M. and Mussieux, R.	Alberta Geological Survey, INF 126, Edmonton, 1 poster, 2003
Institute on Lake Superior Geology	Institute on Lake Superior Geology	ILSG Proceedings and Abstracts, v.50, Part 1, Duluth Minnesota, 161p., 2004
Institute on Lake Superior Geology	Institute on Lake Superior Geology	ILSG Proceedings and Abstracts, v.50, Part 2, Duluth Minnesota, 258p., 2004
Overview of Trends in Canadian Mineral Exploration 2003	Intergovernmental Working Group on the Mineral Industry (IGWG)	IGWG Report, Minerals and Metals Sector, Ottawa, 153p., 2004

Table 9. Mineral deposits not being mined in the Southwest Ontario District in 2004.

Abbreviations

AF ..... Assessment Files
CMH ..... Canadian Mines Handbook
GR ..... Geological Report
MDC ..... Mineral Deposit Circular
MDIR ..... Mineral Deposit Inventory Record
MLS ..... Mining Lands, Sudbury
MR ..... Mining Recorder
NM ..... The Northern Miner
OFR ..... Open File Report
PC ..... Personal Communication

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Amherstburg Quarry silica prospect (40J/03SE)	Silica	20 m thick over 66 ha (20-26 by 10^6 t @ 94% SiO_2)	Amherst Quarries (1969) Ltd.	OFR 5861, p.32 IMR 9, p.29, 31	Inactive
Big Creek 1 (40J/03SE)	Silica	19.5 m thick @ 25 m (10 by 10^6 t of sandstone)	N/A	IMR 9, p.29	Inactive
Big Creek 1 (40J/03SE)	Silica	14.6 m thick @ 34.4 m (10 by 10^6 t of sandstone)	N/A	IMR 9, p.29	Inactive
Dow-Moore 2-20-12 (40J/16NW)	Salt	21 m thick @ 698 m 73 m thick @ 582 m 114 m thick @ 410 m	N/A	PRW Dow-Moore 2-20-XII	Inactive
Eastnor–Lindsay prospect (41H/03SW)	Dolomite	60 by 10^6 t dolomite @ <0.10% impurities (SiO_2+Fe_2O_3+Al_2O_3)	N/A	PRW OGS Lindsay 7-III W	Inactive
Imperial Oil No.560, Sombra 2-12-H, Gormlay No. 1 (40J/090NW)	Salt	32.2 m thick @ 612.6 m 84.1 m thick @ 490.7 m 46.9 m thick @ 388.6 m	N/A	PRW Sombra 2-12-H	Inactive
Imperial Oil No.597, Logierait No.1-Y-R, R.C. Fleck No. 2B (40J/16NW)	Salt	29.6 m thick @ 680 m 87.8 m thick @ 544 m	N/A	PRW Imperial Oil No. 597B	Inactive
Lindsay prospect (41H/03SW)	Dolomite	>35 by 10^6 t dolomite @ <0.10% impurities (SiO_2+Fe_2O_3+Al_2O_3)	N/A	PRW OGS Lindsay 31-VIII W	Inactive
Patton Farm (40J/03SE)	Silica	5.4 m thick @ 10.1 m	N/A	IMR 9, p.29	Inactive
Sunburst GB #7 McGillivray 41-NB (40P/04NE)	Salt	88.7 m thick @ 363.6 m 5.8 m thick @ 339.5 m	N/A	PRW Sunburst GB #7	Inactive
Tobermory prospect (41H/04NE)	Dolomite	60 by 10^6 t dolomite @ <0.10 impurities (SiO_2+Fe_2O_3+Al_2O_3)	N/A	PRW OGS St. Edmunds 47-III W	Inactive
Union Gas-Enniskillen No. 29, D.V.L.A. No. 1 (40J/16SW)	Salt	25.6 m thick @ 610.8 m 78.6 m thick @ 485.5 m	N/A	PRW Union Gas-Enniskillen No. 29	Inactive
Union Gas-Moore No. 12 P&I Williams No. 1 (40J/16SW)	Salt	26.2 m thick @ 577.3 m 70.7 m thick @ 456.6 m	N/A	PRW Union Gas-Moore No. 12- P&I Williams No. 1	Inactive
Union –Moore No. 22 (40J/16SW)	Salt	36 m thick @ 580 m 32 m thick @ 437 m	N/A	PRW Union Moore No. 22	Inactive

Note: The resource estimates listed in this table are historic figures generated by past workers and do not follow the required disclosure for reserves and resources as outlined in National Instrument 43-101.

Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Southern Ontario Regional Resident Geologist (Petroleum Resources Centre)–2004

by

T.R. Carter

2005

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Petroleum Resources Centre–2004

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Petroleum Resources Centre–2004

T.R. Carter

Subsurface Geologist, Petroleum Resources Centre, Ministry of Natural Resources, London

INTRODUCTION

Drilling activity in Ontario continued at the relatively low levels experienced in 2002 and 2003. World oil prices were strong throughout the year due to emerging concerns about world oil supplies, continued supply disruptions in Iraq, low inventory levels of refined petroleum products in the United States, production cutbacks by OPEC and strong demand growth in China. Natural gas prices remained at higher levels than long-term averages due to concerns about decreasing production capacity in western Canada and despite healthy inventories of natural gas in storage reservoirs.

Despite high commodity prices, drilling and production activities in Ontario continued at historically low levels. Preliminary production figures compiled from annual production reports submitted to the Petroleum Resources Centre indicate annual oil production declined 18% to 152 635 cubic metres in 2004, compared to 186 140 cubic metres the previous year. Production of natural gas totaled approximately 355 560 thousands of cubic metres (10^3m^3) compared to 377 745 10^3m^3 the previous year. These declines are directly related to reduced levels of drilling activity both in 2004 and 2003 such that there is insufficient new production to replace reserves produced from existing wells.

EXPLORATION ACTIVITY

A total of 89 licences to drill and operate new wells were issued by the Ministry of Natural Resources in 2004, compared to 117 in 2003. An additional 12 licences were issued for plugging of orphan wells and 430 existing wells were licensed for oil production from historical oil fields. At the time of writing, drilling of new wells was reported to be complete at 80 wells consisting of 23 exploratory wells, 55 development wells, and 2 service wells. Horizontal drilling accounted for only 5 of the wells drilled in 2004. The 2004 exploratory drilling resulted in 13 wells reported as gas producers (Table 1, Figure 1) with no wells completed for production of oil. Development drilling was very successful, with 5 wells reported to be oil producers, 22 as producers, and 10 as private gas wells. Successful oil wells were completed in Ordovician bedrock targets, while completions in Silurian sandstone reservoirs in Norfolk, Haldimand and Elgin counties and offshore Lake Erie dominated the gas-producing wells.

Talisman Energy Inc. was the most active exploration company in Ontario's petroleum industry in 2004, with 25 wells drilled. Echo Energy Inc drilled 9 wells, Onco Petroleum Inc drilled 9 wells, and Greentree Gas & Oil drilled 6 wells.

Cambrian Play

Four exploratory wells were drilled to test Cambrian targets for oil and natural gas potential in 2004. Talisman Energy reported that TLM East Lake Erie 41-U-4 was completed as a gas producer in a new pool discovery.

Ordovician Play

Drilling was reported to be complete at 2 exploratory wells and 5 development wells testing Ordovician targets in 2004. In exploratory drilling GGOL #68 Blandford 8-4-XIV was reported by Greentree Gas & Oil as a potential gas producer. The Ordovician bedrock-focused development drilling resulted in 5 new oil producers for Talisman Energy. Successful oil wells were completed in the Rochester 8-8-I EBR, Mersea 3-4-IV, Mersea 3-6-V, Gosfield South 4-G-II and Lake Erie Romney 233-L pools. All 5 of these wells were drilled horizontally in the reservoirs.

Silurian Sandstone Play

The interest in Silurian sandstone targets continued in 2004 in response to high natural gas prices. A total of 13 exploratory and 35 development wells tested Lower Silurian sandstone targets in 2004. Twelve of the exploratory wells were reported to be potential gas producers in exploratory extensions of known gas pools.

Thirty-one of the development wells were reported as potential gas producers. Successful gas wells were drilled in 6 different pools: South Walsingham 5-6-VI, Bayham, Houghton 7-17-II, Houghton 5-8-ENR, Aldborough 1-21-IV and the Lake Erie-Maitland pool. Ten of the 31 wells were completed as private gas wells in parts of the Lincoln, Welland and Haldimand gas fields.

Silurian Carbonate Play

There were 4 exploratory tests of Silurian Guelph Formation reef and/or Salina Formation structural trap targets in 2004. One well, REC #18 Aldborough 4-24-VII, was reported as a potential gas producer.

There were 14 development tests of Silurian Guelph–Salina targets in 2004. RHR Resources completed 1 well as a gas producer in the Sombra 4-16-IX gas pool, and Onco Petroleum reported 11 wells as potential gas producers in the abandoned Tilbury gas pool.

Devonian Play

One development well was drilled to test Devonian bedrock targets. GGOL #17 Aldborough 2-2-D-VIII was reported as a potential oil well in the Aldborough 7-D-VII pool.

RECOMMENDATIONS FOR EXPLORATION

Ordovician bedrock reservoirs are still the focus of exploration directed at discovery or development of oil reservoirs. Exploration for new pools has declined in this play in the past 3 years with a focus on extension or development drilling of known trends. Essex County and southern Kent County are still the most attractive onshore locations but exploration will have to expand to the north and east if oil production is to be maintained. There is considerable remaining untested potential for natural gas in this area beneath the eastern basin of Lake Erie and onshore east and north from Kent County to the Niagara Escarpment. A recent reassessment of potential in this area by the Ministry of Natural Resources indicates potential remaining undiscovered resources totalling 201 billion cubic feet (bcf) of natural gas and 16.6 million barrels of oil. There also may be potential for trapping of natural gas in sandy facies of the Ordovician Shadow Lake Formation over the crest of the Algonquin Arch.

If natural gas prices remain high the economics of all natural gas production in Ontario are greatly enhanced and unconventional sources of natural gas such as organic-rich shales become attractive. There has already been an increase in drilling in the Lower Silurian sandstone target areas both onshore and offshore, and the platform reef target areas. There is potential for discovery of Cambrian-age gas or oil pools along the pinch-out edge of the Cambrian sandstone in the subsurface, or in fault-controlled structures. There may be considerable unrealised potential in fault-related structural traps in the Salina A-1 and A-2 Carbonate units in Kent, Elgin and Middlesex counties. There is also conceptual potential for a new unconventional natural gas play in the black shales of the Kettle Point Formation, analogous to the very successful Antrim shale area in Michigan and the Ohio shales in Ohio. Evidence of natural gas has been reported in the Kettle Point Formation in Ontario but it has never been targeted for exploration and no scientific studies of its potential have been completed.

Table 1. Successful exploratory wells completed in southwestern Ontario, 2004. See Figure 1 for well locations.

Well #	Well Name	Results	Target	TD	Latitude	Longitude	TD Date
1	TLM East Lake Erie 41-U-4	GP - ACT	CAM	1235.0	42.66888333	-79.67471667	2004-03-22
2	GGOL #68, Blandford 8-4-XIV	GP - POT	ORD	876.0	43.30457500	-80.69589444	2004-11-17
3	REC #18, Aldborough 4-24-VIII	GP - POT	SAL	567.5	42.64016528	-81.59467444	2004-03-12
4	GGOL – Huron #3, Houghton 2-138-STR	GP - POT	CLI	439.0	42.75432722	-80.70935472	2004-01-27
5	Echo 41, Bayham 3 - 27 - V	GP - CAP	CLI	402.0	42.76146667	-80.75608611	2004-01-12
6	Echo 42, Bayham 5 - 23 - V	GP - CAP	CLI	435.0	42.70296944	-80.85674722	2004-06-30
7	Echo 43, Bayham 11 - 130 - STR	GP – ACT	CLI	420.0	42.73083056	-80.82533611	2004-07-02
8	Echo 44, Bayham 5 - 20 - V	GP - CAP	CLI	416.0	42.77895556	-80.79565278	2004-03-10
9	Echo 45, Bayham 5 - 11 - V	GP - CAP	CLI	387.0	42.79236944	-80.76836111	2004-01-12
10	Echo 46, Bayham 5 - 11 - IV	GP - ACT	CLI	422.0	42.68885833	-80.82153889	2004-02-23
11	Echo 47, Bayham 9 - 133 - STR	GP - ACT	CLI	436.5	42.67904444	-80.84770000	2004-07-01
12	Echo 50, Bayham 3 - 9 - IV	GP – ACT	CLI	438.0	42.69046389	-80.84294722	2004-08-31
13	Echo 51, Bayham 10 - 18 - SG	GP - CAP	CLI	402.0	42.75258333	-80.80462222	2004-08-31

Figure 1. Locations of successful exploratory wells completed in southwestern Ontario in 2004.

Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
		LENGTH			
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
		AREA			
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
		VOLUME			
1 cm^3	0.061 023	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m^3
		CAPACITY			
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
		MASS			
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 90**	t
		CONCENTRATION			
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.

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